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THE
NATURAL HISTORY
OF
BRITISH FISHES,

INCLUDING
SCIENTIFIC AND GENERAL DESCRIPTIONS
OF THE
MOST INTERESTING SPECIES,
AND AN
EXTENSIVE SELECTION
OF
ACCURATELY FINISHED COLOURED PLATES,
TAKEN ENTIRELY FROM
ORIGINAL DRAWINGS,
PURPOSELY MADE FROM THE SPECIMENS IN A RECENT STATE,
AND FOR THE MOST PART WHILST LIVING.

VOL. III.

BY E. DONOVAN, F.L.S.

AUTHOR OF THE NATURAL HISTORIES OF BRITISH BIRDS,
INSECTS, SHELLS, &c.

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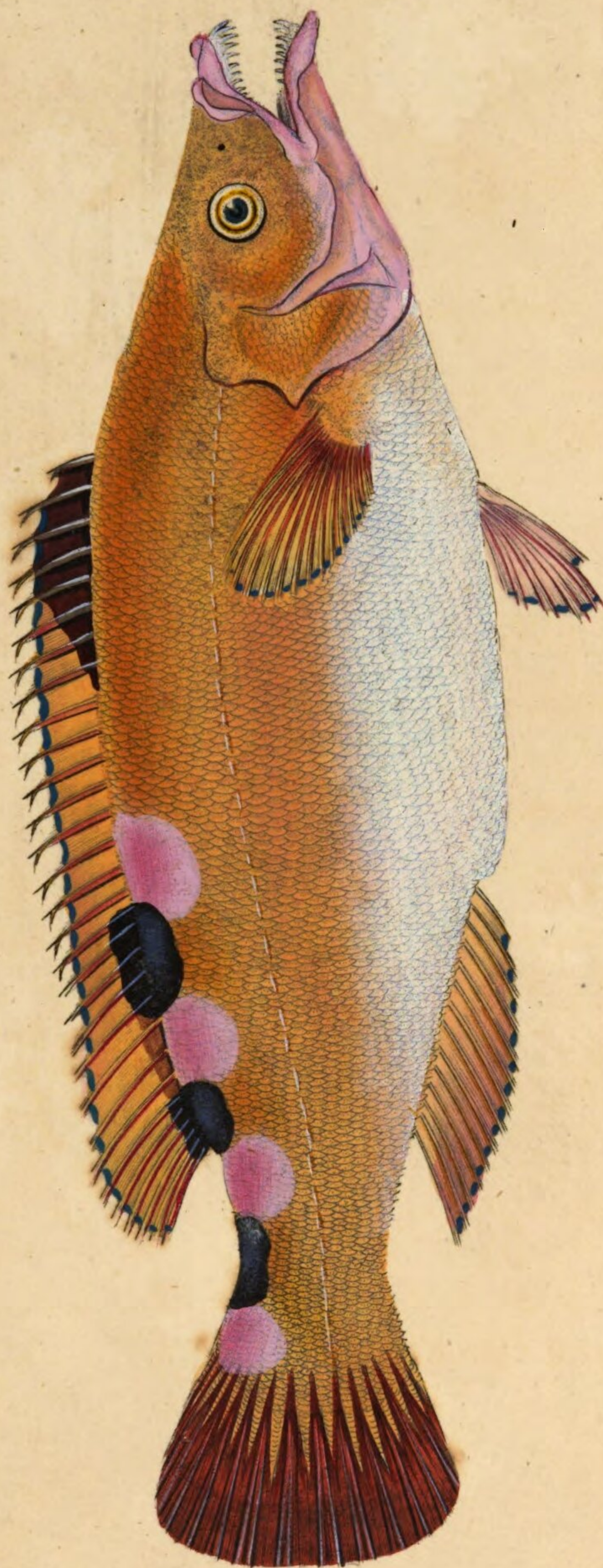
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THE
NATURAL HISTORY
OF
BRITISH FISHES.

PLATE XLIX.

LABRUS TRIMACULATUS.

TRIMACULATED WRASSE.

PISCES THORACICI.

GENERIC CHARACTER.

Teeth acute: lips simple: branchiostegous membrane with six rays, and scaly covers: dorsal fin, with a slender skin beyond the end of each ray; pectoral fin acuminated: lateral line straight.

SPECIFIC CHARACTER

AND

SYNONYMS.

Red: on each side at the base of the dorsal fin two dark spots, and a third between the dorsal fin and tail.

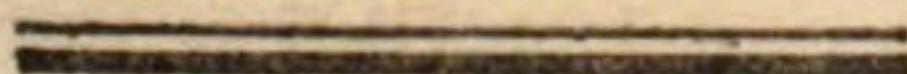
PLATE XLIX.

LABRUS TRIMACULATUS: ruber, maculis 2 utrinque ad basin pinnæ dorsalis, tertiaeque inter hanc et caudam. *Gmel.*

Syst. Nat. 1294. *Sp.* 57.

Labrus Carneus, Le Paon Rouge. *Bloch t.* 289.

Trimaculated Wrasse. *Penn. Brit. Zool. V.* 3. p. 207. n. 4.



In the month of June, 1801, Mrs. Wyatt, a lady resident in Devonshire, most obligingly favoured us with a fine specimen of this interesting Fish, that had been caught on the south coast of that county, near Exmouth.

The length of the specimen is almost twelve inches: its form is graceful, and the colours, when recent, were peculiarly elegant and lovely. A fine orange varying to red upon the back, and becoming paler and whiter towards the belly, is the chief and most pervading colour. The dorsal fin and tail were of a rich orange: the former was also strongly marked with dark purplish black, and prettily edged with blue; and the rest of the fins were of a paler hue. The three dark spots at the posterior extremity of the back, which principally constitutes the specifical distinction of this kind of Wrasse, were of a rich blackish purple. There were also four other spots of a delicate rose colour, situated contiguous to these, which do not appear to have been mentioned by any writer. Two of these spots are disposed in the space between the three darker ones before spoken of, and the third and fourth are placed one at each extremity of the outermost ones, so as to form together a series of seven spots, which are alternately of a pale rose colour, or a very deep purple.

PLATE XLIX.

The Fish above described has thirty rays in the dorsal fin: in the pectoral fin sixteen, ventral fin six, anal fin fourteen, and tail fourteen.

PLATE VIII.

The Tenthredinidae, which are the most numerous of the Hymenoptera, are here represented by the following figures.

1. A female of the species Tenthredo fulva, which is the most common of the genus.

2. A male of the species Tenthredo fulva, which is the most common of the genus.

3. A female of the species Tenthredo fulva, which is the most common of the genus.

4. A male of the species Tenthredo fulva, which is the most common of the genus.

5. A female of the species Tenthredo fulva, which is the most common of the genus.

6. A male of the species Tenthredo fulva, which is the most common of the genus.

7. A female of the species Tenthredo fulva, which is the most common of the genus.

8. A male of the species Tenthredo fulva, which is the most common of the genus.

9. A female of the species Tenthredo fulva, which is the most common of the genus.

10. A male of the species Tenthredo fulva, which is the most common of the genus.

11. A female of the species Tenthredo fulva, which is the most common of the genus.

12. A male of the species Tenthredo fulva, which is the most common of the genus.

13. A female of the species Tenthredo fulva, which is the most common of the genus.

14. A male of the species Tenthredo fulva, which is the most common of the genus.

15. A female of the species Tenthredo fulva, which is the most common of the genus.

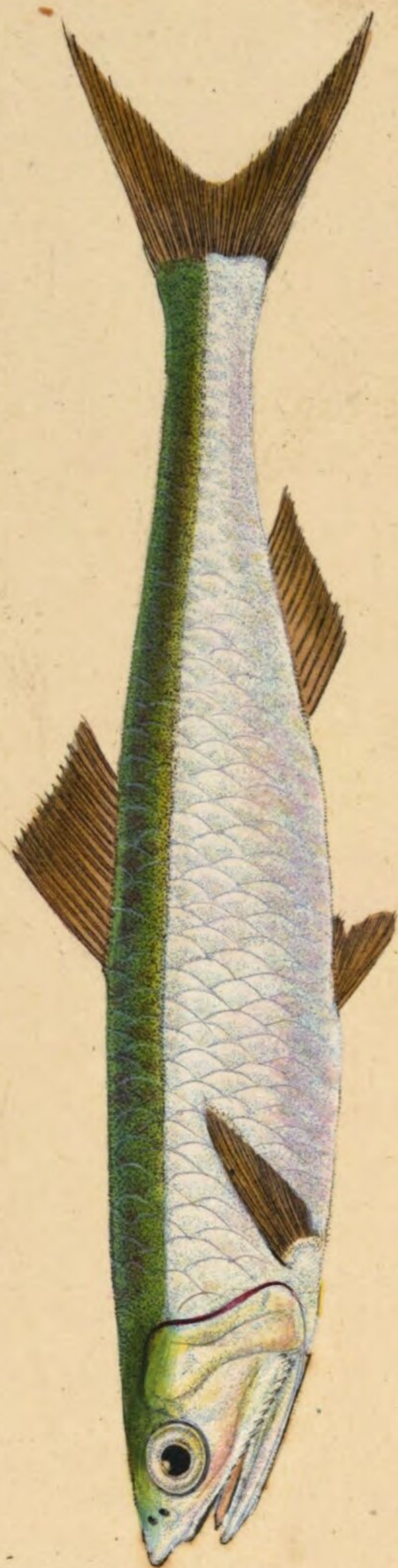


PLATE L.

CLUPEA ENCRASICOLUS.

ANCHOVY.

PISCES ABDOMINALES.

GENERIC CHARACTER.

Head compressed; mouth compressed, denticulate within: jaws unequal, upper one with serrated mystaces: tongue short and rough, with inverted teeth: eyes moderate, round, and margined. Gills setaceous: cover, either of three or four plates, membrane with eight rays. Body compressed, elongated, covered with scales of moderate size: lateral line straight, near the back, and running parallel with it: belly carinated and serrated: usually seven rays in the ventral fin: tail bifurcated.

SPECIFIC CHARACTER.

Upper jaw longest.

CLUPEA ENCRASICOLUS: maxilla superiore longiore. *Gmel. Syst.*

Nat. 1405. *Sp.* 4.

Clupea maxilla superiore prominente. *Bloch Fisch. Deutschl.* 1,

p. 212. *n.* 4. *t.* 30. *f.* 2.

Anchovy. *Will. Icth.* 225.

Raii Syn. pisc. 107.

Penn. Brit. Zool. V. 3. *p.* 347. *Sp.* 163.

PLATE L.

The true Anchovy has been observed on the coast of Hampshire, where a specimen at this time in our possession was caught only a few years since. Mr. Ray, as Pennant observes, discovered this species in the estuary of the Dee about a century and an half ago; after which time no notice was taken of its resorting to the British coasts, till a few were caught near Mr. Pennant's house at Downing, in Flintshire, in the year 1769.

At certain seasons the Anchovy, like the sprat and herring, appears in vast shoals on all the sea coasts of the southern parts of Europe, as well as in the north seas, and the Atlantic ocean. Bloch acquaints us that it is found in the Baltic sea, but rarely. Upon the coasts of Portugal, Spain, and the south of France and Italy, they are taken in the greatest plenty. They are caught from the month of December till March, but the principal fisheries commence in May, and continue till the end of July. The Anchovies of Brabant are in much esteem, as are also those of Gorgona, a small island lying to the westward of Leghorn, where they are taken in vast numbers, and beheaded, gutted, and pickled for exportation; the Anchovy being in very general use as a sauce for other fish, which occasions a considerable demand for this article. The Greeks and Romans, we are told, were well acquainted with this fish, and prepared a *garum*, or kind of pickle from it, which they held in considerable estimation.

Three or four inches at the most is the usual length of the Anchovy when full grown. Sometimes they are found still larger. The specimen in our possession is about four inches and an half in length. In the dorsal fin are fifteen rays; pectoral fin fifteen; ventral fin seven; anal fin fourteen; and in the tail twenty-four.



PLATE LI.

PLEURONECTES MEGASTOMA.

WHIFF.

PISCES THORACICI.

GENERIC CHARACTER.

Head small. Eyes spherical, both on the same side of the head, and near each other. Mouth arcuated. Jaws dentated, unequal. Gill-membrane with from four to seven rays. Gill-covers of three plates in general. Body compressed, carinated; upper side sub-convex; beneath flat and pale. Vent nearest the head.

SPECIFIC CHARACTER

AND

SYNONYMS.

Body oblong, livid variegated with blackish: mouth large, inferior jaw advanced: lateral line incurvated

PLEURONECTES MEGASTOMA: corpore oblongo livido nigricante-variegato, ore magno: maxilla inferiore porrecta, linea laterali incurvata.

WHIFF. *Ray Syn. p. 162. pl. 1. f. 2.*

Penn. Brit. Zool. 3. p. 111.

PLATE LI.

This Fish appears to be described for the first time by Ray, in the Appendix to his Synopsis, under the provincial of Whiff; the name by which it is commonly known in the maritime parts of Cornwall. Mr. Ray speaks of this Fish only on the authority of Mr. George Jago, by whom it is said to have been originally discovered; or, in other words, discriminated with sufficient accuracy to be considered as an undescribed species. It is thus defined specifically: "*Passer Cornubiensis asper, magno oris hiatu;*" and in the Plate which accompanies the description, the Whiff is represented with tolerable fidelity.

The author of the British Zoology (Mr. Pennant) next includes this species among the fishes of this country. The resemblance which he perceives between the Whiff and the Holibut is by no means obvious to us; but although no figure is annexed to the account given of his fish, we have no hesitation in admitting it to be the same as that before described by Mr. Ray under the name of Whiff. Mr. Pennant says one was brought to him by his fisherman, October 31, 1775, and gives the following description of it.—"Its length was eighteen inches, the greatest breadth not seven, exclusive of the fins. The mouth extremely large: teeth very small: the under jaw hooks over the upper: the eyes large, and placed on the left side. The scales great and rough: the side-line uncommonly incurvated at the beginning. After making a sharp angle, goes strait to the tail, and is tuberculated: the tail is rounded. The colour of the upper part of the body is cinereous brown, clouded in parts, and obscurely spotted: the under side white, tinged with red." This is all that Mr. Pennant relates respecting the Whiff in the British Zoology, but the same fish is again mentioned in his Tour through North Wales, wherein he informs us, that "in the year 1777, (about the month of November) that rare species of

PLATE LI.

flounder, the Whiff, was taken in the estuary of the Dee, in Flintshire;" and a figure of it, from the pencil of his artist, Moses Griffiths, is subjoined to that remark.

Some time ago, in a visit to Aber, Caernarvonshire, we were very kindly presented with the drawing of a Whiff, found upon that coast on the 6th of August, 1787, by the Rev. Hugh Davies, now of Beaumaris, Anglesea. This drawing proved the more valuable, as it exemplified some peculiarities that had escaped the cognizance of Mr. Pennant. The tongue Mr. Davies found to be of a subulate conic form, and white; the eyes placed on the left side, having the pupil black, and the iris yellowish. Ten or twelve large dusky circular spots on the back, eight of which formed a circle not very indifferently represented by Mr. Jago in the figure given by Ray. The tail in Mr. Pennant's figure he observed to be too much rounded, and the lower jaw extended further than it ought to be. We think it incumbent to be thus minute in relating the particulars of this communication, in return for the friendship and liberality of this gentleman's assistance. Since that period, we have learnt that the fish itself is by no means so unfrequent on the British coasts as we were at first induced to imagine. From the coast of Cornwall we have more than once received it in fine condition, and are thus enabled to add still further to the history of this curious fish. Besides the local name of Whiff, it is called by the Cornish fishermen the Merry-sole, from the extreme activity of its motions in the water.

We are convinced that this is not the *Pleuronectes punctatus* of Bloch, as Gmelin describes it. The Whiff of Ray, of Pennant, and ourselves, are strictly the same, but the *Pleuronectes punctatus* of Bloch and Gmelin is of another species, altogether distinct. The

PLATE LI.

latter is "*le Targuer*," or "*Grosse Plie*" of Duhamel, and other French writers. Dr. Bloch describes *P. punctatus* with accuracy, but he is certainly mistaken in believing that fish to be the Whiff of Ray, and Pennant, as his synonyms imply. Gmelin adopts the same references as Bloch, most probably relying in confidence on his authority. Dr. Shaw has been also misled in this respect, as well as Gmelin, for he describes minutely as the same species both the Whiff of Pennant, and the *Pleuronectes punctatus* of Dr. Bloch.

Thus we perceive two very different species of the *Pleuronectes* genus are confounded under the provincial English name of Whiff, and it is to be regretted that Dr. Turton increases that confusion by describing even a third species under the very same appellation. The latter writer, in his Translation of Gmelin's *Systema Naturæ*, contrary to the letter of his author, assigns the name of Whiff to the *Pleuronectes Passer* of Gmelin, and Linnæus. The figure of the *Pleuronectes Passer*, as it appears in the History of Fishes published by Dr. Bloch *, accords, we must observe, pretty nearly with the Whiff of Ray, and Pennant, in its general form, and might have induced Dr. Turton to call it the Whiff, in preference to the *Pleuronectes punctatus* to which Gmelin refers. But upon the whole, we are persuaded, notwithstanding this apparent degree of similarity,

* Whether the figure in Bloch's Fishes, inscribed *Pleuronectes Passer*, be really the same as Linnæus means, is doubtful; we rather think it is not. The *Pleuronectes Passer* of Linnæus is so nearly allied to the common flounder (*Flesus*) except in having the eyes placed towards the left side of the head instead of the right, that Gronovius and Pennant, with some other Ichthyologists of repute, believe it to be only an accidental variety of that fish; and certainly Bloch's figure does not convey any very striking idea of its similitude to the common flounder.

PLATE LI.

that the fish described by Bloch under the specific name of *Passer*, ought on no account to be confounded with our Whiff.

In the conclusion of these remarks, it will not be deemed improper to draw a slight comparison between the English Whiff and the *Pleuronectes punctatus*, in order to point out the characters of both with due precision. The form of our fish is oblong, the body being much more elongated than that of *P. punctatus*. The singular rotundity of appearance that prevails in the latter fish, is increased by the curvature of the dorsal and anal fin near the posterior extremity, where they are wider than in any other part, becoming gradually narrower as they proceed towards the head: on the contrary, in the Whiff, the fins are widest across the middle, and slope gradually in breadth towards the head and tail: the mouth is full of large teeth in *P. punctatus*: in our fish the mouth is large, and furnished only with small teeth. The body and fins are marked alike with large black spots, having the intermediate spaces interspersed with red spots of a smaller size in *P. punctatus*: our fish, though marked with spots, have them neither so numerous, nor of such a black colour, and there is not the least trace of the scarlet specklings and spots that appear profusely scattered over the surface of the other. Duhamel's figure is not so darkly spotted as that of Bloch, but the obtuse rotundity of outline by which this species is distinguished from our Whiff, is as apparent in the figure of Duhamel as in that of Bloch.

The dorsal fin in our Whiff contains eighty-five rays: pectoral irteen: ventral five: anal sixty-one: and tail nineteen.

that the first specimen is from the same locality as the second.

and the third is from the same locality as the second.

The first specimen is from the same locality as the second.

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two specimens from the same locality as the second.

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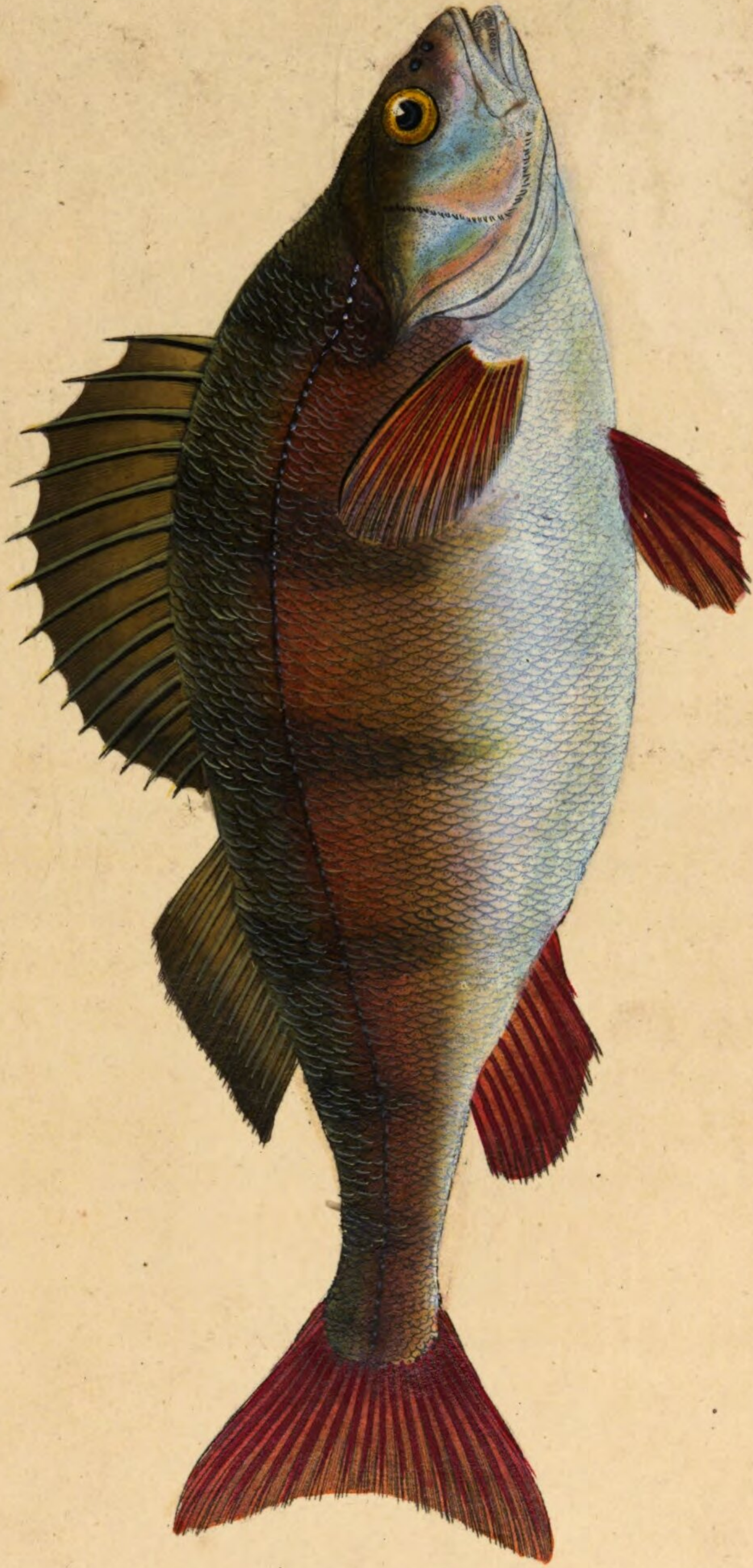


PLATE LII.

PERCA FLUVIATILIS.

PERCH.

* PISCES THORACICI.

GENERIC CHARACTER.

Jaws unequal. Teeth acute, and incurvated. Gill covers of three plates, scaly; the upper plate serrated. Seven rays in the gill membrane. Lateral line arched with the back, scales hard and rough. Fins spinous.

SPECIFIC CHARACTER

AND

SYNONYMS.

Olive, with black bands: dorsal fins olivaceous, the rest sanguineous.

PERCA FLUVIATILIS: olivacea nigro-fasciata, pinnæ dorsali olivacea, caeteris sanguineis.

PERCA FLUVIATILIS: pinnarum dorsalium secunda radiis 16. *Linn. Fn. Suec.* 332.—*Gmel. Syst. Nat.* p. 1306. 168. sp. 1.

Perca pinna ani radiis 11. *Bloch Fisch. Deutschl.* 2. p. 66. n. 2. t. 52.

Borstling, Barschling. *Marsigl. Danub.* 4. p. 65. t. 23. f. 2.

PERCH. *Ray, pisc.* p. 97.

Will. ichth. p. 291.

Brit. Zool. 3. p. 211.

PLATE LII.

The Linnæan specific character of the *Perca fluviatilis* being taken exclusively from the number of rays in the second dorsal fin, is liable to objection, because the amount of these rays is not always precisely sixteen, as that author states them. Bloch mentions this, and observes, for instance, that in the specimen he describes there were only fourteen rays in the second dorsal fin. The specific character of this fish he considers, perhaps with an equal degree of impropriety, may be defined from the number of rays in the anal fin, which he says amount to eleven. These being as liable to vary in point of number, as the rays in the dorsal fin, a much more constant criterion may be observed by attending to the dark transverse bands, which descend from the back across the sides, and point towards the abdomen; the Perch, though liable to variations in colour like all other fishes, being never found entirely destitute of these bands. Beside these, it may not be amiss to speak of the pectoral, ventral, and anal fin, together with the tail, which are always observed to be of a bright red colour.

The Perch remains in those rivers, lakes, and other clear waters, which it inhabits, all the year: affording delicious food, and excellent sport to those fond of the amusement of angling. The manners of this Fish are whimsically described by old Walton. In the *Complete Angler* he tells us, “The Perch is a very good, and a very bold biting fish; he is one of the fishes of prey, that, like the pike and trout, carries his teeth in his mouth, which is very large; and he dare to kill and devour several other kinds of fish: he has a hooked or hog back, which is armed with sharp and stiff bristles, and all his skin armed or covered over with thick, dry, hard scales, and *hath, which few other fishes have, two fins on his back*; he is so bold, that he will invade one of his own kind, which the pike will not do so willingly, and you may therefore easily believe him to be a bold biter.” From this writer we

PLATE LII.

learn that the Perch is very abstemious in winter, and will not readily take the bait except in the middle of the day when the weather proves warm and fine. He says they love to accompany one another, and go together in troops, and “that if there be twenty or forty in a hole, they may be all caught at one standing, they being like the wicked of the world, not afraid though their fellows and companions perish in their sight.”

“The baits for this bold fish (continues Walton) are not many; I mean he will bite as well at some or at any of these three, as at any, or all others whatsoever: a worm, a minnow, or a little frog, of which you may find many in hay-time; and of worms, the dunghill-worm, called a brandling, I take to be best, being well scoured in moss or fennel; or he will bite at a worm that lies under cow-dung, with a blueish head. And if you rove for a Perch with a minnow, then it is best to be alive, you sticking your hook through his back-fin; or a minnow with the hook in his upper lip, and letting him swim up and down about mid-water, or a little lower, and you still keeping him to about that depth by a cork, which ought not to be a very little one: and the like way you are to fish for the Perch with a small frog, your hook being fastened through the skin of his leg, towards the upper part of it; and lastly, I will give you but this advice, that you give the Perch time enough when he bites, for there was scarce ever any angler that has given him too much.”

The months of May and June are the spawning season for the Perch, when a single female of this prolific race, of a moderate size, have been known to lay between two and three hundred thousand eggs; these are all retained together by means of a glutinous sort of

PLATE LII.

jelly, which renders them the favourite food of the smaller kinds of fishes. The Perch is so tenacious of life, that it will live many hours, or even two, three, or four days, after being taken out of the water, and may be easily transported alive, with proper care, to any distance not exceeding sixty or eighty miles. Perch of six or seven inches in length are esteemed of good size for the table, but in many waters where they are suffered to remain unmolested they become much larger. The biggest we have seen was one taken in the Great Pool of Bala, or Pimblemere, near North Wales, that weighed almost five pounds. We have also caught them in the Dee, near its junction with that Pool, of a large size, though much inferior in that respect to the fish abovementioned. Mr. Pennant speaks of one that was taken in the Serpentine River, Hyde Park, that weighed nine pounds, but this writer intimates, that Perch of such magnitude are very uncommon. The Author of the Angler's Sure Guide says, he once saw the figure of a Perch drawn with a pencil on the door of a house near Oxford, that was twenty-nine inches long, and was informed it was the true dimension of a Perch then living*. In the lakes among the mountains of Lapland and Siberia, the Perch is often found of a monstrous size. Bloch assures us, that in one of the churches in Lapland, the dried head of a Perch caught in a contiguous river is preserved as a curiosity, and such it may very truly be considered, that part alone measuring almost twelve inches in length. The enormous fish to which this head belonged when living, may be estimated in length at between four and five feet.

An accidental variety of the species called the crooked, or hump-backed Perch, having the back more elevated near the first dorsal fin,

PLATE LII.

and the lower part of the back bone near the tail very strangely distorted, is mentioned by Linnæus as being sometimes observed in the rivers of Sweden. Pennant records this variety also, stating that it is found in a lake called Llyn Raithlyn in Merionethshire. This variety, it must be acknowledged candidly, we have never had the opportunity of inspecting; but since Dr. Bloch has intimated his suspicions that both Linnæus and Pennant are mistaken, we must add, that there can be little doubt of the existence of a variety so distorted, however its deformity may be occasioned. We are credibly informed by some experienced old fishermen in Merionethshire, that it is still found in more than one of the lakes near the Arrenig mountain.

In the first dorsal fin of our fish there are fifteen spiny rays; and fifteen soft rays in the second dorsal fin: pectoral fin fourteen: ventral eight: anal twelve: and caudal twenty-one.

PLATE III.



PLATE LIII.

RAJA TORPEDO.

ELECTRIC RAY.

***** PISCES CHONDROPTERYGII.

GENERIC CHARACTER.

Spiracles ten, five on each side, oblique, and placed beneath near the neck : head small, pointed, not distinct from the breast, with the mouth beneath, transverse, and toothed : body thin, depressed, and rhombic.

SPECIFIC CHARACTER.

Body entirely smooth.

RAJA TORPEDO : tota lævis. *Linn. Mus. Fr.* 2. p. 50.—*Arted. gen.* 73. *syn.* 102.—*Gmel. Syst. Nat.* T. 1. p. 3. 1504. 130. *sp.* 1. *Bloch aus. Fisch.* 1. p. 44. *n.* 7. *t.* 122, 3, p. 118.

Raja dorso monopterygio, cauda brevi apice pinnato, lævis, inermis, rostro subobtusio. *Gronov. Zooph. n.* 152.

TORPILLE, *Duhamel, Lacépède, &c.* Torpille, Torpède, *fr.* Tremble, and Domiggliose at Bourdeaux, upon the coast of Poitou, Gascony, &c.—Zitterfisch

PLATE LIII.

Germ.—Krampfish. *Holl.*—Torpedine *Sardinia*.
Occhiatella Rome, Salvian.

TORPEDO, CRAMP-FISH. *Will. Ichth.* 81. *Raii Syn. Pisc.* 28.

ELECTRIC RAY. *Penn. Brit. Zool. Vol. 3. p.* 89. *sp.* 36.

It was not before the latter part of the preceding century that the Torpedo was clearly proved to be an inhabitant of the British seas. The first account of it as such that may be relied upon, is contained in a letter addressed by Mr. Walsh to the late Mr. Pennant, dated June 23, 1774, which was laid before the Royal Society of London, and published in their transactions of that year. “To the author of the British Zoology (says Mr. Walsh) it will, I am persuaded, be no unwelcome information, that the Torpedo, or Electric Ray, frequents the shores of this island, contrary to a received opinion among naturalists, who have, in general, considered it as an inhabitant only of warmer climates.”

In consequence of the enquiries set on foot by Mr. Walsh in some of our southern fishing ports, he had received several Torpedos from the coast of Devonshire, when this information was communicated. These were chiefly from Torbay. One obtained from Brixham weighed fifty-three pounds avoirdupois weight, and measured four feet in length, two feet and a half in breadth, and four inches and a half in extreme thickness. The size of this Fish, as Mr. Walsh observes, was enormous, for, he tells us, the largest of seventy specimens examined by him in the neighbourhood of Rochelle, where they are not uncommon, weighed little more than ten pounds, and

PLATE LIII.

measured not quite two feet in length, nor sixteen in breadth; and that mentioned by Redi to Lorenzini, which was considered very large, weighed only twenty-four pounds.

This Fish is much more frequently taken on the southern coast, in the vicinity of Torbay, than upon any other of the British shores. Mr. Grant, a fishmonger on the spot, acquainted Mr. Walsh, that it is however by no means found in plenty even here, as it rarely happens that more than one is taken at a time; nor can the proper season for catching them be ascertained, as they have been seen at all times of the year. The usual depth of water in which they are caught is from thirty-six to forty fathom, and being of the Ray kind are commonly taken with them. As to the time when their young are to be seen, Mr. Grant observes, no satisfactory information can be obtained, but it is imagined, that the season for them and the Rays is the same. He further adds, that the benumbing qualities of these fish is pretty strong through the net, though much weaker than when they are taken out. The Torpedo has been taken also of a large size near Mountsbay, Cornwall. Mr. Smith, in his History of Waterford, speaks of one six or eight pounds weight, being taken about sixty years ago at Dungarvan in Ireland. At Ring, a village in the neighbourhood of that place, Mr. Walsh was told they sometimes capture two or three of them in the course of a year. Mr. Pennant relates that it has been once caught off Pembroke, and we can further say, upon the best authority, that this species has been more than once taken upon the sandy coasts near Tenby, in the county of Pembrokeshire, South Wales.

That the history of the Torpedo has undergone more assiduous investigation than that of almost any other creature of the finny race,

P L A T E L I I I .

is a truth of which every naturalist must be aware. Among the earlier writers of antiquity this Fish was perfectly well known. Hippocrates mentions the *Torpedo*, classes it with the edible kinds of fishes, and recommends the flesh as proper food for persons affected with the dropsy. Aristotle speaks of it in terms that leave no doubt upon the mind of the classic reader, that he was to a certain extent acquainted with its manners of life*. Pliny only repeats the observations of Aristotle, his disciple Theophrastus, and other Greek writers of celebrity, when he asserts, that the *Torpedo* knows her own powers, in being able to benumb others without being herself affected. Aristotle tells us, as well as Pliny, that the *Torpedo* conceals itself in the mud, and waits in readiness to exert its benumbing influence upon the fishes that swim over it, and which falling motionless as if they were dead to the bottom, become an easy prey to this their lurking enemy†. Aristotle was himself apparently indebted for this knowledge, at least in some degree, to preceding writers, whose labours have not survived the wreck of time. That Plato was acquainted with the peculiar powers of this Fish before that period is evident: there is one very striking passage in his dialogue between Socrates, and another which proves the truth of this opinion beyond dispute.—“Thou hast benumbed my senses by thy objections, as that great fish of the sea, the *Torpedo*, benumb those who approach it.” The evidence of Tiphilus, of Plutarch, Oppian, and other writers of antiquity, might be mentioned also, were it incumbent to prove, that

* Arist. lib. v. c. 5.—Lib. ix. c. 37. *Ναρκη*.

† “Quo magis miror quosdam existimasse, aquatilibus nullum inesse sensum. Novit torpedo cum suam ipsa non torpens: morsaue in limose occultat, pisces qui securi super natantes obtorpuere corripiens.” *Plin. lib. IX. c. 42.*

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the Torpedo had been considered in all ages as an object of considerable interest and curiosity.

But when we reflect upon the infant state of natural philosophy in those early ages, the testimony of those writers must be admitted with caution. The ancients knew this Fish, and they also knew the benumbing powers which nature has endowed it with, but its history was still involved in fable. To the united exertions of talents, and assiduous investigation, which in a pre-eminent degree distinguished the former century, we are indebted for the only authentic particulars respecting it, that can be relied upon in confidence. The accurate Borelli, and Lorenzini, and after them the indefatigable Reaumur, opened the way to an accurate enquiry into the electric properties of the animal by dissecting it, and pointing out in a perspicuous manner, the organs through whose medium this property is exerted. To say that the cause and effects arising from the shocks of the Torpedo were however proved to be electric by either of those writers, would be erroneous. The credit of this discovery is due to the memory of our own countryman, Mr. Walsh, who, by a series of experiments before unattempted, was enabled to demonstrate the fact. It was by the fortunate application of the newly detected principles of electricity, as a cause to the effects which it was already known this animal possessed, that Mr. Walsh was more happy in his speculations than his predecessors. He was the first to reason upon the analogy between the powers of electricity, and the inherent electricity of this creature. His experiments were pursued with the greatest industry, and in the sequel proved both satisfactory and conclusive. But Mr. Walsh was himself disposed, with becoming candour, to allow every honour to his friend Dr. Franklin, whose important discoveries on electricity had laid the foundation upon which

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his theory was established. This is sufficiently demonstrated in the conclusion of one of his letters on the Torpedo, in which he compliments his friend in an unusual strain of animation. "I rejoice (says Mr. Walsh) in addressing these communications to you. He, who predicted, and shewed that electricity wings the formidable bolt of the atmosphere, will hear with attention, that in the deep it speeds an humbler bolt, silent and invisible: He, who analysed the electrified phial, will hear with pleasure that its laws prevail in animate phials: He, who by reason became an electrician, will hear with reverence of an instinctive electrician*, gifted in his birth with a wonderful apparatus, and with the skill to use it." *Phil. Trans.*

The paper communicated by Mr. Walsh to the Royal Society in the year 1773, upon the subject of the Torpedo, are extremely curious. They embrace a variety of observations that occurred to him in the progress of his experiments, the most material of which it would be improper to pass over in silence: these we shall select, and lay before the reader as nearly as convenient in the language of the writer.

* This is not the only creature endowed by nature with those amazing properties. *Gymnotus Electricus*, or the Electric Eel, possessing the same powers, as does likewise *Silurus Electricus*, though in a less vigorous degree, and perhaps many others not at present known may be gifted with a similar means of defence against their enemies. A recent French author (*Libes*) speaks thus of bodies which possess the inherent principles of electricity.— "Quelque substances naturelles reçoivent la vertu électrique des mains de la nature par des moyens qui nous sont encore inconnus; elles paroissent constamment dans l'état électrique. Telle est une espèce de Raie qu'on trouve sur les côtes de France, et qui porte le nom de *Torpille*, parce qu'elle engourdit la main de celui qui la touche. D'autres poissons, tels que le *Trembleur du Niger*, et l'*Anguille de Surinam*, jouissent de la même propriété."

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The sea coast of France near Rochelle, and a small spot called the Isle of Ré, afforded Mr. Walsh an ample opportunity for prosecuting his experiments, the Torpedo being frequent in those places. He was restrained by the jealousy of the government, from making those experiments where these animals are caught, but he received them alive, and in such a state of vigour, as enabled him to proceed successfully in his enquiry. With respect to the effect of the Torpedo, he observes, "it appears to be absolutely electrical, forming its circuit through the same conductors with electricity, and being intercepted by the same nonconductors, as glass and sealing wax. The back, and the breast of the animal, appear to be in different states of electricity, I mean in particular the upper, and lower surfaces of the two assemblages of pliant cylinders, engraved in the work of Lorenzini. By the knowledge of this circumstance, we have been able to direct his shocks, though they were small, through a circuit of four persons all feeling them, and likewise through a considerable length of wire, held by two insulated persons, one touching his lower surface, and the other his upper. When the wire was exchanged for glass or sealing wax, no effect could be obtained, but as soon as it was resumed, the two persons became liable to the shock. These experiments have been varied many ways, and repeated times without number, and they all determined the choice of conductors, to be the same in the Torpedo, as in the Leyden phial. The sensations likewise, occasioned by the one and the other, in the human frame, are precisely similar. Not only the shock, but the numbing sensation, which the animal sometimes dispenses, expressed in French by the words *engourdissement* and *fourmillement*, may be exactly imitated with the phial, by means of Lane's electrometer; the regulating rod of which, to produce the latter effect, must be brought almost into contact with the prime conductor, which joins the phial.

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It is a singularity, that the Torpedo when insulated, should be able to give us insulated likewise, forty or fifty successive shocks, from nearly the same part; and these, with little, if any diminution of their force. Each effort of the animal to give the shock, is conveniently accompanied by a depression of his eyes, by which even his attempts to give it to the non-conductors can be observed: in respect to the rest of his body, he is in a great degree motionless, though not entirely so. I have taken no less than fifty, of the above-mentioned successive shocks, from an insulated Torpedo, in the space of a minute and a half. All our experiments confirm, that the electricity of the Torpedo, is condensed in the instant of its explosion, by a sudden energy of the animal; and as there is no gradual accumulation, or retention of it, as in case of charged glass, it is not at all surprising, that no signs of attraction or repulsion, were perceived in the pith balls. In short, the effect of the Torpedo appears to arise from a compressed elastic fluid, restoring itself to its equilibrium, in the same way, and by the same mediums, as the elastic fluid compressed in charged glass. The skin of the animal, bad conductor as it is, seems to be a better conductor of his electricity, than the thinnest plate of elastic air. Notwithstanding the weak spring of the Torpedinal electricity, I was able, in the public exhibitions of my experiments at La Rochelle, to convey it through a circuit formed from one surface of the animal to the other, by two long brass wires, and four persons, which number, at times, was encreased even to eight. The several persons were made to communicate with each other, and the two outermost with the wires, by means of water contained in the basons, properly disposed between them for that purpose; each person dipping his hands in the nearest basin, connectively with his neighbour on either side."

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“ The effect produced by the Torpedo, when in air, appeared on many repeated experiments to be about four times as strong, as when in water.”

The following detailed particulars, of a series of experiments performed by Mr. Walsh, in presence of the academy of Rochelle, appeared in the French Gazette of the 30th of October, 1772, as the extract of a letter received from *Sieur Seignette*, mayor of that place, and secretary of the academy.

“ A live Torpedo was placed on a table. Round another table stood five persons insulated. Two brass wires, each thirteen feet long, were suspended to the ceiling by silken strings. One of these wires rested by one end on the wet napkin on which the fish lay: the other end was immersed in a basin full of water, placed on a second table, on which stood four other basins likewise full of water. The first person put a finger of one hand in the basin in which the wire was immersed, and a finger of the other hand in a second basin. The second person put a finger of one hand in this last basin, and a finger of the other hand in the third; and so on successively, till the five persons communicated with one another by the water in the basins. In the last basin, one end of the second wire was immersed; and with the other end, Mr. Walsh touched the back of the Torpedo, when five persons felt a commotion, which differed in nothing from that of the Leyden experiment, except in the degree of force. Mr. Walsh, who was not in the circle of conduction, received no shock. This experiment was repeated several times, even with eight persons; and always with the same success. The action of the Torpedo, is communicated by the same mediums, as that of

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the electric fluid. The bodies which intercept the action of the one, intercept likewise the action of the other. The effects produced by the Torpedo, resemble in every respect a weak electricity. This exhibition of the electric powers of the Torpedo, before the academy of La Rochelle, was at a meeting, held for the purpose, in my apartments on the 22d of July, 1772, and stands registered in the journals of the academy."

Mr. Walsh further states, in relating this affair to the Royal Society of London, that the effect of the animal in these experiments, was transmitted through as great an extent and variety of conductors, as almost at any time he had been able to obtain it, and the experiments included nearly all the points, in which its analogy with the Leyden phial had been observed. These points were stated to the gentlemen present, as were the circumstances in which the two effects appeared to vary. It was likewise represented to them, that our experiments had been almost wholly with the animal in air: that its action in the water was a capital desideratum: that indeed, all as yet done, was little more than opening the door to inquiry: that much remained to be examined by the electrician, as well as the anatomist: that as artificial electricity had thrown light upon the operations of the Torpedo, this might in return, if well considered, throw light on artificial electricity; particularly in those respects, in which they now seemed to differ. The Torpedo in these experiments, dispensed only the distinct, instantaneous stroke, so well known by the name of the electric shock. That protracted but lighter sensation, that torpor or numbness which he at times induces, and from which he takes his name, was not then experienced from the animal; but it was imitated with artificial electricity, and shewn to be producible by a quick consecution of minute shocks.

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This, in the Torpedo, may perhaps be effected by the successive discharge of his numerous cylinders, in the nature of a running fire of musquetry; the strong single shock may be his general volley. In the continued effect, as well as in the instantaneous, his eyes, which are usually prominent, are withdrawn into their sockets."

"A large Torpedo, very liberal of his shocks, being held with both hands, by his electric organs above and below, was briskly plunged into water, to the depth of a foot, and instantly raised an equal height in air; and was thus continually plunged and raised, as quick as possible, for the space of a minute. On the instant his lower surface touched the water in his descent, he always gave a violent shock, and another still more violent in his ascent; both which shocks, but particularly the last, were accompanied with a writhing in his body, as if meant to force an escape. Besides these two shocks from the surface of the water, which may yet be considered as delivered in the air, he constantly gave at least two when wholly in the air, and as constantly one, and sometimes two, when wholly in the water. The shocks in water appeared, as far as sensation could decide, not to have near a fourth part of the force of those which took place at the surface of the water, nor much more than a fourth of those entirely in air."

"The shocks received in a certain time were not on this occasion counted by a watch, as they had been on a former, when fifty were delivered in a minute and half, by the animal in an insulated and unagitated state: but from the quickness with which the immersions were made, it may be presumed there were full twenty of these in a minute; from whence the number of shocks in that time must have amounted to above an hundred. This experiment, therefore, while

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it discovered the comparative force between a shock in water and one in air, and between a shock delivered with greater exertion on the part of the animal, and one with less, seemed to determine that the charge of his organs with electricity was effected in an instant, as well as the discharge."

"The Torpedo when put into a flat basket, open at the top, but secured by a net with wide meshes, and in this confinement was let down into the water a foot below the surface: being there touched through the meshes, with only a single finger, on one of his electric organs, while the other hand was held at a distance in the water, he gave shocks which were distinctly felt in both hands."

"The circuit for the passage of the effect being contracted to the finger and thumb of one hand, applied above, and below to a single organ, produced a shock, to our sensation, of twice the force of that in the larger circuit by the arms."

"The Torpedo still confined in the basket, being raised to within three inches of the surface of the water, was there touched with a short iron bolt, which was held half above, and half in the water, by one hand, while the other hand dipped, as before, at a distance in the water; and strong shocks, felt in both hands, were thus obtained through the iron."

"A wet hempen cord being fastened to the iron bolt, was held in the hand above water, while the bolt touched the Torpedo, and the shocks were obtained through both these substances."

"A less powerful Torpedo, suspended in a small net, being frequently dipped into water, and raised again, gave, from the

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surface of the water, slight shocks, through the net, to the person holding it."

"These experiments in water manifested, that bodies, immersed in that element, might be affected by immediate contact with the Torpedo; that the shorter the circuit in which the electricity moved, the greater would be the effect; and that the shock was communicable, from the animal in water, to persons in air through some substances."

"How far harpoons and nets, consisting of wood and hemp, could in like circumstances, as it has been frequently asserted, convey the effect, was not so particularly tried as to enable us to confirm it. I mention the omission in hope that some one may be induced to determine the point by express trial."

"We convinced ourselves, on former occasions, that the accurate Kæmpfer, who so well describes the effect of the Torpedo, and happily compares it with lightening, was deceived in the circumstance, that it could be avoided by holding in the breath, which we found no more to prevent the shock of the Torpedo, when he was disposed to give it, than it would prevent the shock of the Leyden phial."

"Several persons, forming as many distinct circuits, can be affected by one stroke of the animal, as well as when joined in a single circuit. For instance, four persons, touching separately his upper and lower surfaces, were all affected. Two persons likewise, after the electricity had passed through a wire into a basin of water, transmitted it from thence in two distinct channels, as their sensation convinced them, into another basin of water, from whence it was conducted,

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probably in an united state, by a single wire. How much further the effect might be thus divided, and subdivided into different channels, was not determined; but it was found to be proportionably weakened by multiplying these circuits, as it had been by extending the single circuit."

A very complete, and most instructive series of the Torpedo, including both the sexes, with anatomical preparations of the several organs concerned in producing the electric effects of the animal, are preserved in the valuable collection of the late Mr. J. Hunter *, which we have been obligingly permitted to inspect. Most of those specimens were sent by Mr. Walsh, from the coast of France. Mr. Hunter was induced at the solicitation of Mr. Walsh, to prosecute his inquiries relative to the internal organization of the Torpedo, at the same time that Mr. Walsh was himself engaged in a course of experiments on its electricity, and the result of both were laid before the Royal Society, in the year 1773.

Of the general structure and anatomy of the Torpedo, Mr. Hunter observes in this paper †, he shall say nothing, because it does not differ materially in those respects from the rest of the Ray tribe, except in its electric organs, which he proceeds to explain as follows: "These organs are placed on each side of the cranium and gills, reaching from thence to the semicircular cartilages of each great fin, and extending longitudinally from the anterior extremity of the animal, to the transverse cartilage which divides the thorax from the

* The property at this time of the Royal College of Surgeons, London.

† *Phil. Trans.* 1773. p. 48.

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abdomen; and within these limits, they occupy the whole space between the skin of the upper, and of the under surface: they are thickest at the edges, near the centre of the fish, and become gradually thinner towards the extremities. Each electric organ, at its inner longitudinal edge, is a convex elliptic curve. The anterior extremity of each organ, makes the section of a small circle; and the posterior extremity makes nearly a right angle with the inner edge. Each organ is attached to the surrounding parts by a close cellular membrane, and also by short and strong tendinous fibres, which pass directly across, from its outer edge, to the semicircular cartilages. They are covered above and below by the common skin of the animal; under which there is a thin fascia spread over the whole organ. This is composed of fibres which run longitudinally, or in the direction of the body of the animal: these fibres appear to be perforated in innumerable places; which gives the fascia the appearance of being fasciculated: its edges all round, are closely connected to the skin, and at last appear to be lost, or to degenerate into the common cellular membrane of the skin. Immediately under this is another membrane exactly of the same kind, the fibres of which, in some measure, decussate those of the former, passing from the middle line of the body outwards and backwards. The inner edge of this is lost with the first described; the anterior, outer, and posterior edges, are partly attached to the semi-circular cartilages, and partly lost in the common cellular membrane. This inner fascia appears to be continued into the electric organ, by so many processes, and thereby makes the membranous sides or sheaths of the columns, which are presently to be described; and between these processes the fascia covers the end of each column, making the outermost or first partition. Each organ is about five inches in length, and, at the anterior end, three in breadth, though it is but little more than

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half as broad at the posterior extremity. Each consists wholly of perpendicular columns, reaching from the upper to the under surface of the body, and varying in their lengths, according to the thickness of the parts of the body where they are placed; the longest column being about an inch and a half, and the shortest about one fourth of an inch in length, and their diameters about two tenths of an inch. The figures of these columns are very irregular, varying according to the situation and other circumstances. The greatest number of them are either irregular hexagons, or irregular pentagons; but from the irregularity of some of them, it happens, that a pretty regular quadrangular column is sometimes formed. Those of the exterior row, are either quadrangular, or hexagonal, having one side external, two lateral, and either one or two internal. In the second row, they are mostly pentagons. Their coats are very thin, and seem transparent, closely connected with each other, having a kind of loose net-work of tendinous fibres, passing transversely and obliquely between the columns, and uniting them more firmly together. These are most observable, where the large trunks of the nerves pass. The columns are also attached by strong inelastic fibres, passing directly from the one to the other. The number of columns in different Torpedos of rather small size, appears to be about 470 in each organ, but the number varies according to the size of the fish; and in a very large Torpedo, the number of columns in one electric organ was 1182. They must therefore increase, not only in size, but in number, during the growth of the animal, new ones forming perhaps every year on the exterior edges, as they are the smallest. This process may be similar to the formation of new teeth in the human jaw, as it increases. Each column is divided by horizontal partitions, placed over each other at very small distances, and forming numerous interstices, which appear to

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contain a fluid. These partitions consist of a very thin membrane, considerably transparent. Their edges appear to be attached to one another, and the whole is attached by a fine cellular membrane, to the inside of the columns. They are not totally detached from one another; and I have found them adhering at different places, by blood vessels passing from one to another. The number of partitions contained in a column of one inch in length, of a Torpedo, which had been preserved in proof spirit, appeared, upon a careful examination, to be one hundred and fifty: and this number, in a given length of column, appears to be common to all sizes in the same state of humidity, for by drying they may be greatly altered; whence it appears probable, that the increase in the length of a column, during the growth of the animal, does not enlarge the distance between each partition in proportion to the growth; but that new partitions are formed, and added to the extremity of the column from the fascia. The partitions are very vascular; the arteries are branches from the veins of the gills, which convey the blood that has received the influence of respiration. They pass along with the nerves to the electric organ, and enter with them: then ramify, in every direction into innumerable small branches upon the sides of the columns, sending in from the circumference all around upon each partition small arteries, which ramify, and anastomose upon it; and passing also from one partition to another, anastomose with the vessels of the adjacent partitions. The veins of the electric organ, pass out close to the nerves, and run between the gills, to the auricle of the heart. The nerves inserted into each electric organ, arise by three very large trunks, from the first of these in its passage outwards, turns round a cartilage of the cranium, and sends a few branches to the first gill, and to the anterior part of the head, and then passes into the organ towards its anterior extremity. The

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second trunk enters the gills between the first and second openings, and after furnishing it with small branches, passes into the organ near its middle. The third trunk, after leaving the skull, divides itself into two branches, which pass to the electric organ through the gills; one between the second and third openings, the other between the third and fourth, giving small branches to the gill itself. These nerves having entered the organs, ramify in every direction between the columns, and send in small branches upon each partition where they are lost. The magnitude, and number of the nerves bestowed on these organs, in proportion to their size, must on reflection, appear as extraordinary as the phænomena they afford. Nerves are given to parts either for sensation or action. If we except the more important senses of hearing, seeing, tasting, and smelling, which do not belong to the electric organs, there is no part, even of the most perfect animal, which, in proportion to its size, is so liberally supplied with nerves; nor do the nerves seem necessary for any sensation, which can be supposed to belong to the electric organs; and, with respect to action, there is no part of any animal with which I am acquainted, however strong and constant its natural actions may be, which has so great a proportion of nerves. If it be then probable, that those nerves are not necessary for the purposes of sensation or action, may we not conclude that they are subservient to the formation, collection, or management of the electric fluid? especially as it appears evident from Mr. Walsh's experiments, that the will of the animal does absolutely controul the electric powers of its body; which must depend on the energy of the nerves."

That the electric organs of the Torpedo are described with accuracy by Mr. Hunter, in the above paper, is pretty certain. The most

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diligent naturalists among those who have since attended to the internal structure of the animal, having been unable to detect any omission of material consequence in that anatomical dissertation. The observations of Mr. Walsh and Mr. Hunter roused the curiosity of many. The Abbe Rozier entered at considerable length into its history, an account of which was published about two years after the joint papers of Mr. Walsh and Mr. Hunter appeared in the transactions of the Royal Society. Duhamel followed, and was equally assiduous in his investigations. And Spallanzani, beside some other ingenious observers, pursued the same enquiry. There is also a very copious dissertation on the electric properties of the Torpedo, with strictures on the observations of Mr. Walsh and Mr. Hunter, by Mr. Cavendish, in the sixty-sixth volume of the Philosophical Transactions. To the writings of these respective authors we must refer the reader, desirous of more ample information concerning the anatomy of those organs, as we shall ourselves take leave of the subject, after relating some few particulars that have fallen from the pen of Lacepede respecting them. Those observations are not important for their novelty, but still deserve mention. This naturalist, proceeding to describe those parts of the Torpedo in which the galvanic faculty resides, explains the structure of those organs in the following manner :—" De chaque côté du crâne et des branchies est, un organe particulier qui s'étend communément depuis le bout du museau jusqu'à, ce cartilage demi-circulaire qui fait partie du diaphragme, et qui sépare la cavité de la poitrine de celle de l'abdomen. Cet organe aboutit d'ailleurs, par son côté extérieur, presque à l'orifice de la nageoire pectorale, et est plus épais dans son côté intérieur. Entre cet organe et la peau, on voit deux espèces de bandes superposées l'une à l'autre, dont la supérieure, à fibres longitudinales, s'unit avec la peau par le moyen d'un tissu cellulaire, et dont l'inférieure, à fibres

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transversales, se continue dans l'organe par un très-grand nombre de prolongemens membraneux, qui y forment des prismes verticaux à cinq ou six pans, ou pour mieux dire des tubes dont la hauteur diminue à mesure qu'ils s'approchent du bord, et qui sont remplis d'une substance mollassse, transparente, qu'on a reconnu, par l'analyse, être composée d'albumine et de gélatine. On a compté dans chacun des deux organes d'une *Torpille*, jusqu'à près de douze cents de ces prismes, les un réguliers, les autres irreguliers, mais tous divisés, dans leur intérieur, en plusieurs intervalles, par des cloisons membraneuses, horizontales, transparentes. De plus, chaque organe est traversé par des artères, des veines, et des nerfs, qui courent dans toutes les directions, et qui y portent une vie active *."

" On ne peut se refuser à voir, dans ce double organe, une assemblage de piles galvaniques plus petites, mais aussi beaucoup plus nombreuses que celles qui ont été observées dans la *Gymnote Electrique* †. C'est donc encore le fluide galvanique qui agit ici, et non le fluide électrique ; mais les différences qui existent entr'eux sont trop légères pour qu'on doive changer les expressions employées ci-devant ‡."—" On peut donc encore dire, 1°, que toute l'électricité de la *Torpille* est renfermée, et produite par ses doubles organes, et que les autres parties de son corps ne servent que de conducteurs ; 2°, que l'effect des organes semble être dépendant et subordonné à sa volonté ; 3°, qu'on ignore si elle peut faire agir un organe indépendamment de l'autre ; 4°, qu'on ne reçoit aucune commotion

* Vide also Journal de Physique de l'Abbé Rozier, 1775.

† Gymnotus Electricus, Electric Eel.

‡ Bosc. Nov. Dict. Nat.

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lorsqu'on touche en même temps les deux organes en dessus ou dessous, mais qu'il y en a toujours, une lorsqu'on établit une communication entre le dos, et le ventre ; 5o, que la peau et les nagebires servent de conducteurs, quoique plus foiblement que le fer."

The benumbing faculties of this animal, when exerted to the utmost, are neither so powerful, nor so terrible, as the ignorant in early times were taught to conceive. In the warmth of an invigorated imagination, their poets feigned that vessels in full sail might be arrested in their progress through the briny waves by its intervention only ; and that the astonished fishermen were oftentimes struck motionless while hauling up their nets in which their lurking captive, the Torpedo, lay entangled. Oppian describes the power of its shock upon the angler in a similar manner.

" The hook'd Torpedo, with instinctive force,
Calls all his magic from its secret source :
Quick through the slender line and polish'd wand
It darts, and tingles in th' offending hand.
The palsied fisherman, in dumb surprise,
Feels through his frame the chilling vapours rise :
Drops the lost rod, and seems, in stiffening pain,
Some frost-fix'd wanderer on the polar plain."

Shaw's Trans.

But although the exaggerations of the ancients are not to be retained, we are not entirely to reject their evidence. The history of the animal is now better known ; the extent of its electric powers more fully ascertained ; and yet the assertions of the ancients in some particulars deserve credit. Pliny tells us, that the Torpedo, when

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touched with a spear or stick, can benumb the strongest arm, or stop the swiftest foot. That the Torpedo cannot be handled with impunity, when at first taken out of the water, we have the assurance of some old fishermen, who have several times caught it in their nets, when trawling upon the southern coast for flat fish. They insisted that its benumbing influence was felt with equal force, when touched with the boat hook, or the hand. Another circumstance related by Pliny, is verified by Mr. Walsh, who tells us, that when the Torpedo is accidentally left upon the shore by the ebbing tide, it buries itself in the sand, by briskly flapping the extremities, which falls upon the upper surface of the fish, and by that means conceals it from view. In this situation Mr. Walsh observes, the Torpedo is capable of giving its most violent shock, which is strong enough to throw down the passenger that inadvertently treads upon him. Spallanzani discovered in the course of his experiments, that not only the Torpedo in an infant state, but those yet unborn, when extracted from the womb of the pregnant female, are able to communicate the electric shock with a sensible degree of vigour. Some further experiments were tried on this animal, by Dr. John Ingenhouz, at Leghorn, in the year 1773, in company with Dr. Drummond, the particulars of which are inserted in the philosophical transactions. From the remarks of this gentleman we learn, that the Torpedo upon that coast lie on a muddy bottom, about twenty miles from the shore. He took an excursion to this spot for the express purpose of fishing for them, and caught five. Before the nets were taken up, he charged a coated jar by means of a glass tube, and gave a shock to some of the sailors, who all told him they felt exactly the same sensation when they touched the Torpedo. He further learnt, that this creature has very little force in the winter, and cannot live a long time out of the water. As soon as caught, he put the Torpedos,

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with other fish, into a tub of water, the latter of which did not appear to be at all hurt by those associates *. On pressing his thumbs upon the upper side of the two soft bodies on each side the head, Dr. Ingenhouz, in about the space of a minute or two, felt a sudden trembling in the thumbs, which extended no further than the hands, and lasted about two seconds. Sometimes the shock was so strong as almost to oblige the hand to let go the fish, and at others was scarcely at all perceptible. The Torpedo being suspended by a clean and dry silk ribbon, attracted no light bodies, such as pith balls, or others put near it. A coated bottle applied to the fish thus suspended, did not at all become charged. When the fish gave the shock in the dark, he heard no cracking noise, nor could he perceive any sparks. When the fish was pinched with the nails, it did not give more, or fewer strokes than when not pinched. But by folding its body, or bending its right side to the left, the shocks were felt more frequently, and every circumstance tended to prove, that those shocks were perfectly voluntary.

Writers are by no means agreed as to the goodness of this fish, as an article for the table. Galen recommends it, because the flesh is easy of digestion, and salutary for persons in ill health, and he also tells us, that the living fish applied externally to the head, cures many disorders with which that part is sometimes affected. Dioscorides says, the rheumatism is cured by applying it externally. Rondelet does not allow the flesh to be wholesome, assuring us the Prefect of

* This appears to imply a contradiction to the experiments of M. Reaumur, who confined a live Torpedo in a bucket of sea-water with a duck for some hours, when the latter was found dead, as was concluded, from the reiterated shocks received from the Torpedo.

PLATE LIII.

Health, forbids its being sold in the markets at Venice, though on the coast of France it is sometimes sold and eaten. Mr. Walsh caused one of a large size that was caught at Brixham, on the south coast of England, to be dressed and brought to table, but some friends suffered a little by their curiosity in tasting it. The electric organs, the latter observes, which make up one half of the fish, are mucilaginous, and unwholesome, but the rest is palatable as any of the Ray tribe. Dr. Bloch remarks, with much propriety, that the new experiments which have been made in our days upon the principles of electricity, clearly show, that a commotion of the same nature as that occasioned by the shocks of the Torpedo, might be successfully employed for the relief of some disorders, to which the human frame is incident. Among the Abyssinians, it is customary to administer the Torpedo for the cure of the fever, by applying it successively to all the members of the person affected. This operation is attended with cruel torture, but as a remedy, is deemed infallible. The same custom prevails also among the Ethiopians.

In point of colours of the upper surface of this fish, are observed to vary considerably, from a pale brown to a deep blackish purple. The five remarkable dusky spots, which are strongly characteristic of the mediterranean sort, is comparatively very pale in those found in the more northern parts of Europe, and in many are not at all perceivable. They feed on other fish, a surmullet, and a plaise, having been found by Mr. Walsh in the stomach of a Torpedo, on dissection. The generation of the Torpedo is described by Aristotle*, and the accuracy of this writer has been confirmed, by the

* Arist. Hist. anno lib. v. c. 5.

PLATE LIII.

testimony of a late observer ; notwithstanding Lorenzini is disposed to contest the veracity of this ancient philosopher. M. Saunier of La Rochelle, upon opening a very large Torpedo, on the 10th of September, discovered floating in the left matrice, nine fœtuses quite formed, near two inches long, and distinct from them nine eggs in a state of forwardness ; and in the right matrice were four fœtuses, and nine eggs, in the same state as the former. Aristotle was therefore right in asserting that the Torpedo brings forth her young at the autumnal equinox.

The Torpedo is distinguished from all other species of the Ray tribe, by the perfect smoothness of the skin all over. Near the extremities a vast number of minute pores may be observed. The eyes are small : and the whole appearance of the fish is inelegant, if not disgusting.

PLATE III.



PLATE LIV.

PETROMYZON FLUVIATILIS.

LAMPERN, or LESSER LAMPREY.

***** PISCES CHONDROPTERYGII.

GENERIC CHARACTER.

Head more slender than the body. Mouth longer above than beneath: teeth orange, hollow within, and surrounded by a fleshy margin. Spiracles seven on each side the neck. A fistulous aperture on the nape. Without pectoral, and ventral fins.

SPECIFIC CHARACTER

AND

SYNONYMS

Second dorsal fin angulated.

PETROMYZON FLUVIATILIS, pinna dorsali posteriore angulata.

Linn. Fn. Suec. 290.—*Gmel. Syst. Nat.* 1.

p. 3. 1514. *sp.* 2.

Petromyzon unico ordine denticulorum minimorum in limbo oris
praeter inferiores majores. *Arted. gen.* 64.

syn. 89. *sp.* 99.

PLATE LIV.

Petromyzon ordine dentium unico. Bloch. Fisch. Deutschl. 3.

p. 41. t. 88. f. 1. 2.

Mustela. Plin. lib. 9. c. 19.

Lampreda. Gesn. ic. anim. p. 326.

*Le Pétromyzon pricka. Bosc. Hist. Nat.—Petite Lamproie, or
lamproie de rivière. Buffon de Deterville, &c.*

Lesser Lamprey. Penn. Brit. Zool. v. 3. p. 60. n. 2.

The lesser Lamprey is specifically defined by the angulated structure of the second dorsal fin. Bloch thinks it is to be distinguished from the rest of the *Petromyzon* genus by the teeth; which, according to this writer, consist of a single series disposed in a circular manner within the mouth. His account is different from that of our countryman Mr. Pennant. The latter compares the form of the mouth to that of the sea lamprey. "On the upper part (he says) is a bifurcated tooth; on each side are three rows of very minute ones; on the lower part are seven teeth, the exterior of which on each side is the largest." To reconcile those authors is no task of difficulty. Mr. Pennant has taken into consideration the detached teeth in different parts of the mouth, while Bloch regarded only those which are conspicuous in the upper and lower series, and even those he does not speak of with his accustomed accuracy.

Since Dr. Bloch considers the disposition of those teeth as a specific criterion of *Petromyzon fluviatilis*, it will not be thought improper to describe them minutely. In the anterior part of the mouth we observe a singular bony process, or tooth, of a size comparatively very large, which being curved and pointed at both extremities, re-

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semble two remote teeth, and have been described as such by Bloch, in speaking of the anterior circle of them ; but there is no incision or separation of any kind between them to constitute two teeth. On each side contiguous to this bony process, but still distinct, is a tooth with a double fang ; the process in the center, and double tooth on each side, forming together the first principal series of the teeth. The next behind are two trifurcated teeth, not extending, like the preceding, entirely across the roof of the mouth, but only placed one on each side of it. The third, or posterior series, contain in the center seven distinct teeth rising from a single bony process, the exterior ones on each side from the central tooth becoming gradually larger and longer. At each end of this series is a small detached tooth with a double fang. Beside these, there are in the anterior part of the mouth, in front of the bifurcated process mentioned in the first series, five or six teeth of a middle size, disposed in an irregular manner. The outer border of the mouth has a number of other teeth that are very minute, but still perceptible to the touch when the finger is drawn over them.

The only species of this genus described by writers as inhabitants of this country, are *marinus*, *fluviatilis*, and *branchialis*. The kind we are now speaking of cannot readily be confounded with the two others. *Marinus* in a young state, is marked and spotted very distinctly : *fluviatilis*, it should be observed, is likewise found occasionally variegated with dusky marks more or less distinct, but it is uniformly distinguished by the connection between the second dorsal fin, and that of the tail, the second dorsal fin in *P. Murinus* being distinct. The species *branchialis* is known by the linear form of this fin, the annulated body, and the mouth being destitute of teeth, a circumstance, the latter, that has escaped the observation of Mr. Pennant.

PLATE LIV.

Petromyzon fluviatilis varies greatly in respect of colour. The belly is commonly silvery: the sides rather darker, and sometimes yellow, finely glossed with gold: the back dusky, blueish, blackish, or obscurely streaked; and the fins brown, sometimes violet, sometimes sanguineous. Lacepede describes several analogous species that are found in the rivers of France. One in particular that approaches very nearly to the young of this; and were it not for the rounded instead of angulated form of the dorsal fins, we might be inclined to think it rather a variety than a distinct species. The kind alluded to is called by Lacepede, *Petromyzon septæil*, and is described as being six or seven inches long, the colour greyish lead colour, and all the lower parts of a yellowish white. It is found in abundance in the Seine, and rivers flowing into that water.

The lesser Lamprey inhabits various parts of Europe, but is nowhere more frequent than in Prussia, and some of the states of the German empire, especially in Silesia, Pomerania, and the marsh of Brandenburg. The rivers of France produce it likewise, although in less abundance. According to Gmelin, it is found in the lakes of Japan, and South America, as well as those of Europe. In England this fish is more abundant in the Thames, than any other river. Mr. Pennant speaks of this sort being caught in vast quantities, by the fishermen in the vicinity of Mortlake, to be sold to the Dutch as bait for their cod and turbot fisheries*. The larger ones are

"Above 450,000 have been sold in a season for forty shillings per thousand. Of late, about 100,000 have been sent to Harwich for the same purpose. It is said the Dutch have the secret of preserving them till the Turbet fishery." *Penn. Brit. Zool.* If we are not misinformed, these are taken much less abundantly, than in the time of Mr. Pennant. The demand for them has declined some years.

PLATE LIV.

sometimes potted with the great Sea Lamprey, and being of a much milder flavour are in more esteem. Commonly, they are eaten stewed like eels. Broiled or fried they are rather tough, and of no very pleasant flavour. They bear a low price, and are remarkable for having no vertebral bone.

This fish is prepared for table in another manner, in some part of the German empire; after broiling them, and placing them in layers with bay-leaves, spices, and vinegar, they are packed up in barrels, and sent to different parts of the country. Bloch, who informs us of this particular, acquaints us further, that they are only esteemed good in the winter; during the summer, he says they are not wholesome. It is at this season of the year, they are afflicted with a disease that breaks out in little excrescences, which the fishermen call *ræude*. They conceal themselves at such times among the stones at the bottom of the water, or retire to the sea, from whence they migrate into the rivers again in the month of January. Their spawning season is in March and April, when they deposit a vast number of eggs, among the stones on the banks of rivers, where many of them are eagerly devoured by other fishes.

This creature is extremely tenacious of life, existing many hours after it is taken from its native element. On the borders of the river Bausker in Courland, where they are taken of a larger size than elsewhere, they are captured in great numbers under the ice in the winter, and being packed in snow are conveyed alive to very remote parts of the empire. When the Lampreys conveyed in this manner are unpacked at the close of their journey, they appear torpid, but upon being immersed in cold water, soon recover their activity.

PLATE LIV.

Through the fistulous opening on the head, this fish spouts out the water in the same manner as the animals of the cetaceous tribe.



PLATE LV.

SQUALUS CATULUS.

LESSER SPOTTED SHARK.

***** PISCES CHONDROPTERYGII.

GENERIC CHARACTER.

Head obtuse. Spiracles four to seven, placed on the side of the neck, and semilunar. Eyes oblong, vertical, half covered, and situated before the temporal orifices. Mouth beneath, in the anterior part of the head: teeth numerous, serrated, acute, partly moveable: partly fixed; and unequal. Body oblong, roundish, and rough, with tender prickles. Ventral fins for the most part smaller than the pectoral; approximate, and situated round the vent, or genitalia, in the males.

SPECIFIC CHARACTER.

Nostrils surrounded with a lobe and vermiform appendage: ventral fins united.

SQUALUS CATULUS: naribus lobulo et appendice vermiformi cinctis,
pinnis ventralibus concretis. *Gmel. Linn. Syst.*
Nat. p. 1490. sp. 10.

Squalus varius pinnis ventralibus concretis. *Bloch. Aush. Fisch. 1.*
p. 21. n. 5. t. 114.

Lesser Dog-fish. *Penn. Brit. Zool. 3. p. 90. n. 9.*

PLATE LV.

The Lesser Spotted Shark is of the number of those voracious creatures that haunt our coasts in plenty, and prove injurious to our fisheries. They are often captured by the fishermen in the net when trawling for flat fish.

The largest specimen of this kind we have taken is two feet five inches in length; and they very rarely exceed that measurement. There is another species that approaches very nearly to this that grows to about twice that size. This is *Squalus Canicula*, a fish so nearly resembling the present both in the form of the body, the colours and spots, as scarcely to be distinguished from it, except by the ventral fins, which are always found unconnected with each other, while in *Squalus Catulus* they are as invariably united. Gmelin is in doubt whether *Squalus Catulus* may not be the male of *Squalus Canicula*.

Both kinds are found in all the European seas; and it is also said in those of India.



PLATE LVI.

SYNGNATHUS TYPHLE.

***** PISCES BRANCHIOSTEGI.

SHORTER PIPE-FISH.

GENERIC CHARACTER.

Head small. Snout sub-cylindrical, long, turned up at the apex. Mouth terminal, without teeth or tongue, and furnished with a lid. Lower jaw moveable. Gill-covers large, striated, and closed or shut up. Spiracle on the nape tubular, the opening small. Body articulated with many sided scales. No ventral fins.

SPECIFIC CHARACTER

AND

SYNONYMS.

Caudal and pectoral fins radiated: anal fin small; body hexagonal; abdomen somewhat carinated; snout broad and compressed.

SYNGNATHUS TYPHLE: pinnis caudæ pectoralibusque radiatis ani minima, corpore sexangulato, abdomine subcarinato, rostro lato compresso.

SYNGNATHUS TYPHLE: pinnis caudæ, ani, pectoralibusque radiatis, corpore sexangulato. *Linn. Fn. Suec.* 377.—
Gmel. Syst. Nat. t. 1, p. 3. 1454. sp. 1.

PLATE LVI.

Syngnathus corpore medio hexagono, cauda pinnata. Art. Gen. 1.

Syn. 1. sp. 3.

SEA-ADDER. *Borl. Corn. p. 267. pl. 26. f. 12.*

SHORTER PIPE-FISH. *Penn. Brit. Zool. t. 3. p. 140. 61.*

LE SYNGNATHE TROMPETTE. *Buff. de Deterville, v. 7. p. 240.*

The *Syngnathi* appear to be more imperfectly defined by naturalists than almost any other genera of fishes. With respect to the British species in particular, nothing can be more ambiguous. Whether we advert to the days of Ray, and Willughby, or Sibbald; to Borlase, or the late Mr. Pennant, the obscurity prevails in an equal measure. Linnæus does not escape the critical censure of Dr. Bloch for his erroneous conception of certain species, and it might be easy to prove, as well as intimate, that Bloch himself has rather increased than cleared up the confusion Linnæus created. To enter into an investigation of all the species described by Linnæus, his successor Gmelin, or by Bloch, would be irrelative to our present purpose. The French naturalists, among whom Lacepede stands most distinguished, have endeavoured to restore the arrangement of the species of this genera to lucid order, but after all there are uncertainties remaining to be overcome. Several of the species described by early writers are far from being correctly known. Nor can we be certain, in some instances, whether what are now considered as varieties, may not in reality be distinct from the species to which they are supposed to be connected; or whether among the number of those described as species, some have not been too hastily assumed, and may prove hereafter to be varieties only.

PLATE LVI.

Notwithstanding the example of the great Linnæus, there is a radical defect in presuming, that the presence or absence of any particular fin, can constitute an unerring specific distinction of the different fishes of this genus. Nature has herself afforded other characters, that are equally perspicuous, and more constant, or at least less liable to accident. Sometimes Linnæus has paid a cursory attention to those characters, but he does not attend sufficiently to them. The fallacy of the Linnæan specific characters, will be at once seen for instance in the species *Acus*: should this be accidentally bereft of the anal fin it becomes *Pelagicus*; and it is only by regarding its secondary character with caution, that the error can be detected. Again, if both the pectoral and anal fin be destroyed, what criterion have we to distinguish it from *Æquoreus*? *Ophidion* affords another example of the same nature: when recent, the body is round and smooth, but when dry, appears slightly hexagonal, and in this state, scarcely differs from the Linnæan species *Barbarus*; the pectoral fins are then the principal distinction, and if these be broken off, the *Ophidion* will correspond with the character of that species*.

* In treating of any genera less ambiguous than the present, Linnæus could not be considered blameable for adopting characters that might render imperfect specimens of the species he describes liable to misconception. But when we consider the confusion likely to prevail among the Linnæan *Syngnathi*, and their *synonyms*, in consequence, we cannot avoid expressing a wish that he had attended more closely to other collateral characters. He does regard the shape of the body, but this is not sufficient. The exact structure of the snout, if taken into consideration, would have greatly assisted in determining the respective species.

The fins in all these fishes are small and delicate, and therefore apt to be frequently mutilated, and in dried specimens especially. In the figures given by old writers, we seldom find the fins correctly drawn, the fault arising perhaps from this cause, rather than from the

PLATE LVI.

Of the British Syngnathi, Mr. Pennant mentions four kinds, namely, the *Longer Pipe-Fish*: the *Shorter Pipe-Fish*, under which is comprehended the two Linnæan species, Typhle and Acus; and the *Little Pipe-Fish*. The shorter Pipe-fish is the species under consideration.

“ This,” says Mr. Pennant, “ is shorter and thicker than the longer Pipe-fish, yet I have seen one of the length of sixteen inches. The middle of the body in some, is hexangular, in others, heptangular. Linnæus constitutes two species of them, his Syngnathus Typhle, and Syngnathus Acus, but we join with Doctor Gronovius, in thinking them only varieties of the same fish.”

Those two kinds being found occasionally together, have been considered as appertaining to the same species, by others, beside Gronovius, and Pennant. But it is scarcely any longer a matter of opinion with many, they are pretty generally admitted by Ichthyolo-

inattention of the designer. This precludes the possibility of quoting them as synonyms with confidence. From the position of the angulated kinds, indeed, when subjected to the eye of the artist, except in a profile view, the anal fin must be necessarily concealed beneath the abdomen: but the omission, or misrepresentation of the other fins are not excusable on this account.

The indefinite figure (No. 61, of Pennant's Zoology,) in all probability had lost the pectoral fins, since the description we suppose to relate to this figure, (No. 60.) speaks of those fins, as does also the description (No. 61.) to which that figure refers. Bloch is persuaded, that Osbeck has misled Linnæus, in describing his species Pelagicus without an anal fin, conceiving that part to have been accidentally destroyed. In this particular we have endeavoured to shew that Bloch is not correct, but in the present circumstance it proves how easily one species may be mistaken for another, when their specifical distinction is taken chiefly from the fins only.

PLATE LVI.

gists at this time, to be specifically different. Linnæus describes them in the same words, observing only, that the body in Typhle is six sided, while that of Acus has seven sides. The seventh angle in Acus, is formed by the raised line that extends longitudinally along the belly, commencing at the throat, and reaching down to the vent. This line in Acus is prominent and distinct. In Typhle such a line is observable likewise, traversing the center of the abdominal plates in a similar manner, but it does not assume the strongly elevated form of a carina as in Acus.

Linnæus regards the number of annulations in those species, only as secondary to his specific characters. In this respect, he is perfectly right. We have examined many of both kinds, and find that although in point of number there is generally an agreement between the specimens of each individual sort, they are not constantly the same. For instance in Typhle, the number of whose joints are stated at 18 in the trunk, and 36 in the tail, we have found instead with 18...37—19...36—and 17...42, the latter nearly corresponding with Acus. And Acus which is said to have 20 joints in the trunk, and 43 in the tail, is also susceptible of variation.

This irregularity in the number of the annular joints, leads us to have recourse to other characters, in which respect the structure of the snout appears more constant than almost any other. So far as we have been able to ascertain the circumstance, this may be trusted. In all the specimens of Typhle we have examined, the snout is large, broad, and sub-compressed on the sides. It passes from the crown of the head, which is flat, to the mouth, in a straight line, or with very little sinuosity; instead of which, in Acus, the outline from the nape over the crown of the head rises conspicuously, then takes a curva-

PLATE LVI.

ture over the eye, and slopes considerably towards the base of the snout. When viewed in profile, the difference between the two is very striking, the snout of *Acus* never appearing to exceed in breadth two thirds of the head; while in *Typhle*, the snout and head are both of the same breadth. Had not Linnæus previously assigned a specific character to this species, we should for this reason call it *latirostris*, in order to distinguish it at once from the other kind.

It may be questioned whether the *S. Typhle* of Bloch be not rather a variety of *Acus* in a young state, in which the belly has been perhaps but slightly carinated. The structure of the snout as represented, is exactly that of *Acus*. He speaks also of five rays in the anal fin, which is only one less than in *Acus*, at the same time that it is two more than is usual in the anal fin of *Typhle*.

The number of rays in the dorsal fin of the specimen delineated in our Plate is forty-one; in the pectoral fin twelve; in the anal fin three; and in the tail twelve

This kind is found in all the northern seas of Europe. The colour is variable from greenish olive, to olivaceous yellow, and brown variegated sometimes with dark, or blueish lines. Its length seldom exceeds a foot.

PLATE 1

Fig. 1

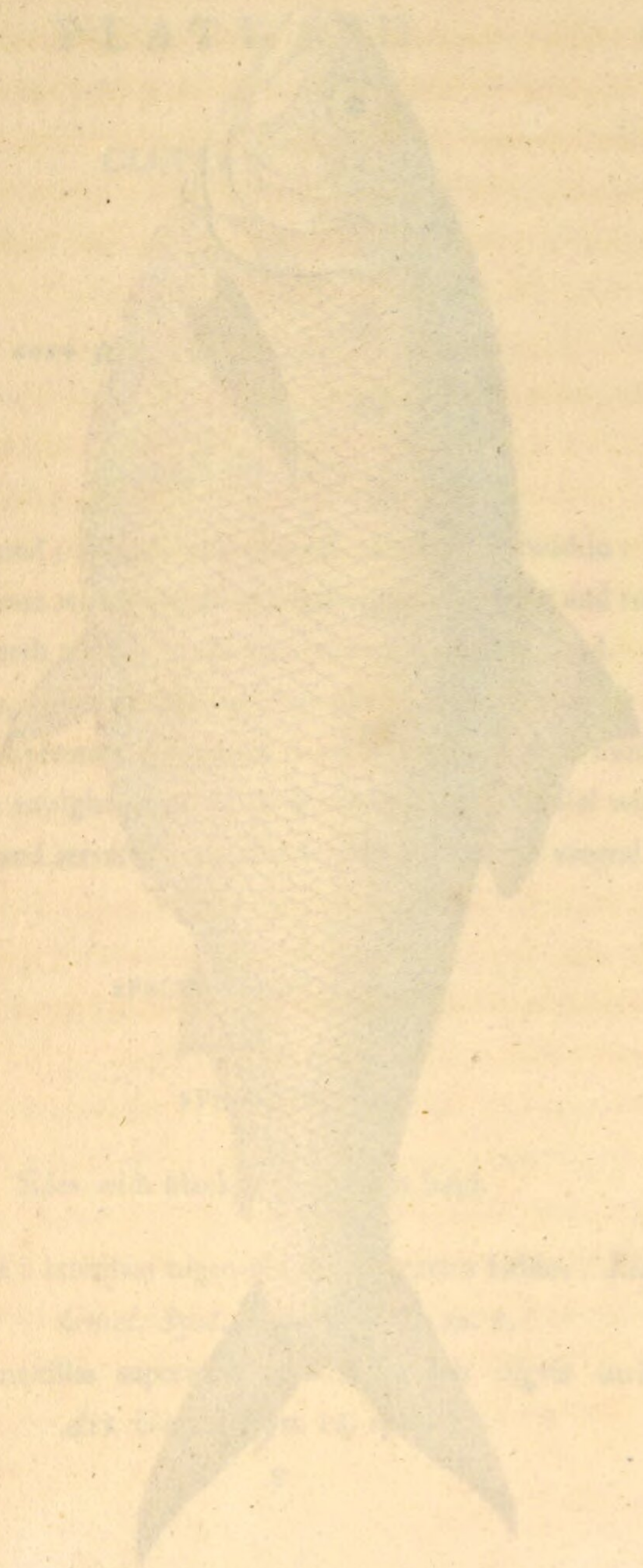


Fig. 2

General appearance of the shark, showing the head, dorsal fin, and tail. The shark is shown in profile, facing left. The dorsal fin is located on the back, and the tail is at the rear. The head is pointed and has a large eye.

Fig. 3

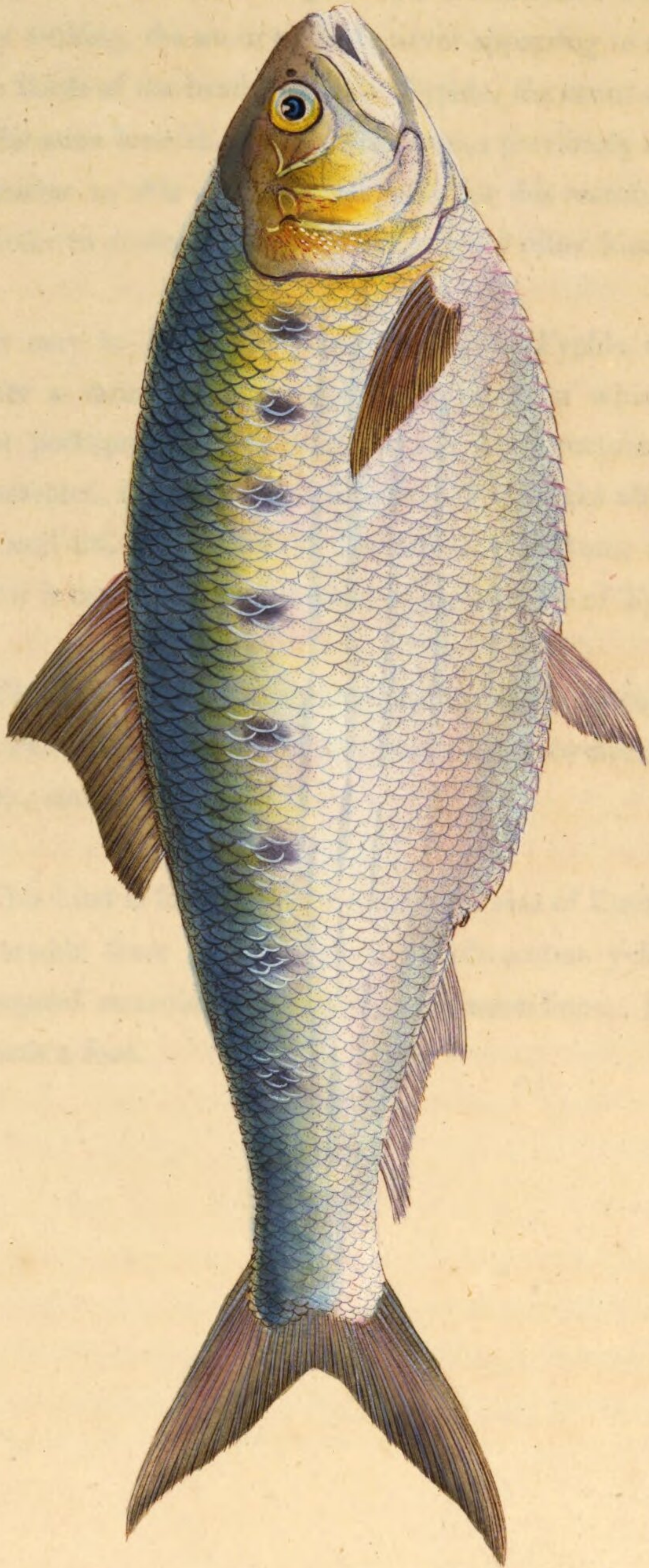


PLATE LVII.

CLUPEA ALOSA,

SHAD.

**** PISCES ABDOMINALES,

GENERIC CHARACTER.

Head compressed; mouth compressed, denticulate within: jaws unequal, upper one with serrated mystaces: tongue short and rough, with inverted teeth: eyes moderate, round, and margined. Gills setaceous: cover, either of three or four plates, membrane with eight rays. Body compressed, elongated, covered with scales of moderate size: lateral line straight, near the back, and running parallel with it: belly carinated and serrated: usually seven rays in the ventral fin: tail bifurcated,

SPECIFIC CHARACTER

AND

SYNONYMS.

Sides with black spots: snout bifid.

CLUPEA ALOSA: lateribus nigro-maculatis, rostro bifido. *Linn.*—

Gmel. Syst. Nat. p. 1404. sp. 3.

Clupea apice maxillæ superioris bifido, maculis nigris utrinque.

Art. Gen. 7. syn. 15. sp. 34.

P L A T E L V I I .

Clupea maxilla superiore in apice crenata. Bloch. Fisch. Deutschl.

1. p. 209. n. 3. t. 30. f. 1.

Harengus dorso et apicis vertice ex albo flavescentibus, &c. Klein.

miss. pisc. 5. p. 72. t. 19. f. 4.

Thrissa. Aldrov. pisc. p. 500.

Laccia, Alosa. Salvian aq. p. 103, 104.

Clupea, SHAD. Will. Ichth. p. 227. t. p. 3. f. 1.—Raj. pisc. p. 105. n. 6.

SHAD. Brit. Zool. 3. p. 296. n. 5.

ALOSE, in France. Laccia, Italy. Saccolos, Spain. Alse, Else, May-fish, and Gold-fish, Germany. Elft, Holland. Brisling, Sildinger, Sardeller, Denmark. Shelesniza, Beschenaja ryba, Russia. Sardellæ-baliik, Turkey. Saghboga, Arabia.

The colours of this common fish when living, are remarkable for their peculiar beauty. Its back is of a dusky blue, changeable to green and yellow; the sides silvery, and elegantly glossed with various hues; the belly white; or faintly tinged with yellow.

Commonly the whole fish when first taken from the water, glows with a pale but a lovely golden yellow, with the exception of the front of the head, which is transparent; and the spots, which on close inspection are black, appear at that time of a purplish hue. The Linnæan specific character of this fish, is principally taken from those spots, which are disposed in a longitudinal series along the sides. Those spots vary much in their strength of colour in different

PLATE LVII.

species, either from the condition of the fish, its age, or the particular season of the year. Sometimes they are remarkably vivid, at others scarcely discernible, and even in the same fish they appear much stronger, after scales on the sides are partly rubbed off. The lateral spots by which the shad is distinguished, in some individuals amount to ten: they do occasionally occur with only four or five, but the intermediate numbers about seven or eight are the most frequent. An opinion prevails, that as the fish grows old, those spots fade away, and at last entirely disappear. Independent of those lateral spots, there are commonly two others upon the tail, one of which is situated on the upper, and the other on the lower edge, contiguous to the base.

The Shad is known as an inhabitant of many parts of the world. In the Mediterranean, the Persian, Egyptian, and American seas, we learn it to be most abundant: it also swarms in those of the northern parts of Europe at some times of the year. The haunts of this fish are the open sea, which it leaves at certain seasons, in order to ascend rivers to deposit its spawn, in places of convenient security.

The time of its appearance in the same rivers is pretty constant, but they do not ascend all rivers at the same time. This may vary according to the nature of the climate, and may be also governed in some measure by the temperature of the season. In the Nile for instance, it is seen in January, or even in December. It passes from the sea up the Rhone in March: in the Wolga, Rhine, and Elbe, it is seldom observed till April or May, and in some of the rivers on the continent its appearance is so regular about the month of May, and not before, that it has acquired the name of *May-*

PLATE LVII.

*Fisch**. All those rivers it leaves again in autumn, returning at that season to the sea. It is not a little extraordinary, that the fry of the Shad has never yet been ascertained, although those first ascend rivers to deposit their spawn, and must be therefore hatched in such places as may be easily visited by the inquisitive naturalist. We are persuaded there need no longer exist any doubt as to the identity of the fry of this fish. There is a diminutive species of *Clupea*, called a white bait, that is found in abundance during the summer, in the Thames, near Greenwich, which is evidently the young of the common Shad, notwithstanding the opinion of Mr. Pennant to the contrary. This fish has excited much curious speculation. The author of the British Zoology, enters at length upon the subject, and after endeavouring to prove that it is neither the fry of the Shad, the Sprat, the Smelt, or the Bleak, concludes that they approach the nearest to the Bleak, under which head he describes it.

The Thames affords this fish in shoals, from the beginning of May till the middle of June, about which time the fishermen are prohibited from taking them, because at that time they are in full spawn. A short time after they again disappear, only a few stragglers remaining in the river till the end of July, or beginning of August, when the fishermen find no more till the summer following.

Being considered as a poor insipid food, the Shad bears an inferior price compared with other fish in the neighbourhood of London, a fish of two or three pounds weight being commonly sold for about

* Bloch.

PLATE LVII.

sixpence. They are usually eaten fried with parsley, or stewed. Mr. Pennant speaks of the Severn Shad as a delicate fish at the time of its first appearance in that river: in that part which flows by Gloucester, they are taken in nets in plenty, and sell at times dearer than Salmon. This writer tells us the Severn Shad is sometimes sent to London, where the fishmongers distinguish them from those of the Thames kind by the French name of Alose.

The flesh of the Shad is not considered wholesome by some people. In Russia, where they appear in great abundance in the Wolga, and other rivers, they are held in such abhorrence, that when they are entrapped with other fish in the nets, the fishermen throw them back again into the water. They call the Shad *Beschenaja ryba*, or the enraging fish, having prepossessed themselves with the silly notion, that it enrages even to madness those who eat of it. As Hasselquist relates, it is found in the Mediterranean near Smyrna, and on the coast of Egypt near Rosetta. In the months of December and January, this fish, he tells us, ascends the Nile as far as Cairo, where it is caught, and dressed in a particular manner with a stuffing of pot marjoram; and the fish thus prepared for food, he assures us, will very nearly intoxicate the eater. The Arabs are fond of this Fish, which they cure by first smoking them, and then drying them in the air; they are eaten with dates.

There is a smaller sort of Shad sometimes accidentally taken about the entrance of the River Thames, which the fishermen consider as a kind of herring. This we have received from correspondents at different seasons of the year, and on the most attentive comparison, are convinced they are only the common Shad, not yet arrived at full maturity. The fishermen have the superstitious notion, that every

PLATE LVII.

shoal of herrings is preceded by one of those fishes, who is therefore denominated by them, the leader, mother, or the queen of herrings. This is to all appearance the same fish as Mr. Pennant tells us, is taken in great numbers in the Severn, immediately after the true Shad leaves that river; and which the people near Gloucester call the Twaite. This Mr. Pennant observes, "differs only from a small Shad, in having one or more round black spots on the sides; if only one, it is always near the gill, but commonly there are three or four, placed one under the other." In other respects they perfectly agree, except in size, the Twaite weighing from half a pound to two pounds at the utmost, while the true Shad weighs sometimes eight pounds, though commonly only from four to five pounds each. The *mother-herrings* we have seen, have scarcely ever exceeded the size of the common herring.

In England there is nothing peculiar in the fishery of the Shad, but in Germany, and other countries on the European continent, the mode of capture sometimes pursued in the Shad fisheries, is altogether singular. The fishermen in those parts have an idea, that the Shad is terrified at storms, and troubled waters, that it loves quiet, and is delighted to excess with the sounds of music. They therefore seek the most retired parts of the rivers, which the Shad frequents, to spread their nets. To those nets they fasten bows of wood, to which are suspended a number of little bells, in such a manner as to chime in harmony together, whenever the nets are moved. The Shad once attracted by the sound to the snare, will not, they say, attempt to make their escape, while the bells continue to jingle. And even while the fishermen are in the act of drawing up the nets, the poor fish lie listening with motionless surprise to the alluring sounds: their efforts to retreat from the fatal

PLATE LVII.

net are paralysed, and they submit with scarce a struggle to the destiny that awaits them. The idea of thus enticing the Shad to the snare, by the power of music, seems to be derived from days of classical antiquity. Ælian speaks of this fish being attracted by the sound of castagnettes made with shells, and rang in unison with the songs of fishermen.

The Shad feeds on worms, insects, and the smaller kinds of fish. In its turn it is the prey of larger fishes. The Perch is among the number of its greatest enemies.

In the dorsal fin of the specimen represented, are twenty rays: pectoral fin nineteen rays: ventral fin twelve rays: anal fin twenty one; and tail twenty-six.

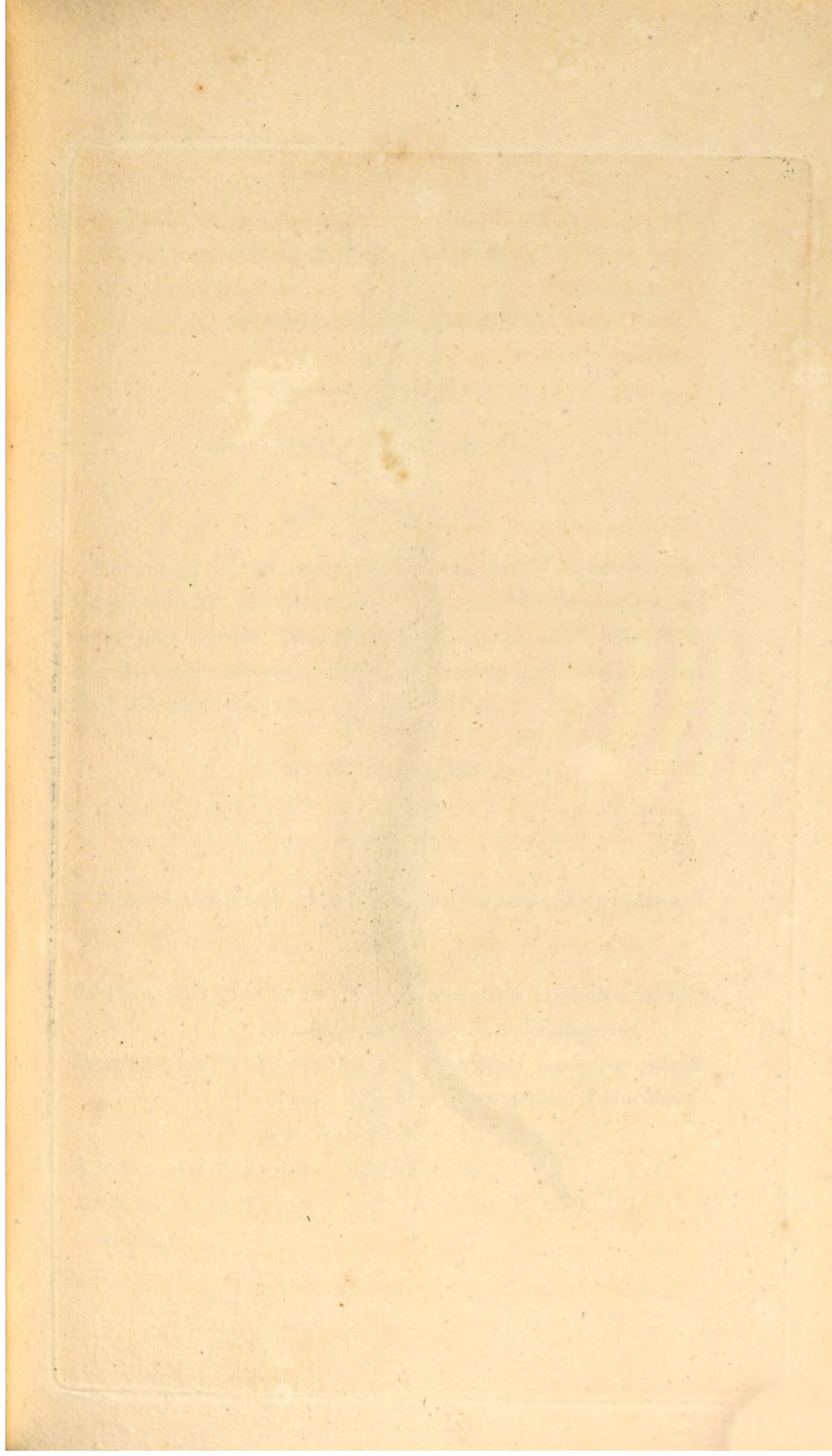




PLATE LVIII.

SYNGNATHUS PELAGICUS.

PELAGIC PIPE-FISH.

***** PISCES BRANCHIOSTEGI.

GENERIC CHARACTER.

Head small. Snout sub-cylindrical, long, turned up at the apex. Mouth terminal, without teeth or tongue, and furnished with a lid. Lower jaw moveable. Gill-covers large, striated, and closed or shut up. Spiracle on the nape tubular, the opening small. Body articulated with many sided scales. No ventral fins.

SPECIFIC CHARACTER

AND

SYNONYMS.

Pectoral and caudal fin radiated; anal fin none; body linear and seven sided.

SYNGNATHUS PELAGICUS: pinnis pectoralibus caudæque radiatis,
ani nulla, corpore linearis septemangulato.

SYNGNATHUS PELAGICUS: pinnis pectoralibus caudæque radiatis
ani nulla, corpore septemangulato. *Linn. Gmel.*

Syst. Nat. 1455. *sp.* 3.

SYNGNATHUS PELAGICUS. *Osbeck it.* 105.

LE SYNGNATHE TUYAU. *Bosc. Dict. Nat. T.* 21. *p.* 315.

PLATE LVIII.

This is a diminutive sort of Pipe-fish, not unfrequently caught in the winter season among the sprats near our coasts. At the first glance, this little Fish appears to bear a very strong resemblance to *Syngnathus Acus*, and may possibly have been confounded with the young of that species, for it has hitherto remained unnoticed as a native of our seas *.

The body of this species is marked longitudinally with seven angles, in which particular it agrees with *Syngnathus Acus*. It differs in being of a more linear form, the snout is comparatively smaller, and the whole length of the fish scarcely ever exceeds five or six inches: those of seven inches long may be considered of a large size. The colour is pale brown, marked more or less distinctly with transverse darker bands, but this is no positive criterion, the species can be distinguished only by its linear form, the shape of the snout, the greater number of joints in the body and tail, and by the total absence of the anal fin.

Osbeck is the first describer of this species. He speaks of it as an inhabitant of the Indian seas. Most likely it is of the migratory kind, as it has been oftentimes seen floating with fuci, and other marine weeds, both in the Indian and Atlantic ocean. Osbeck describes it as destitute of an anal fin, which Bloch observes, has led Linnæus into an error. Lacepede conjectures, however, that Bloch is himself mistaken, and being unacquainted with the true *Pelagicus*, has repre-

* Quere. May not Pennant's figure, No. 61, of Plate XXIII. Vol. III of *Brit. Zool.* be taken from a fish of this species, in which the pectoral fins and tail were dried up, or had been destroyed by accident?

PLATE LVIII.

sented a variety of *Acus* under that name. This we are inclined to think correct, because the fish delineated by Bloch does not appear in any manner distinct from *Acus*, except in the slight distortion of the body near the dorsal fin, and in having the body striped transversely with a darker colour.

In the dorsal fin of the specimen we have represented, there were twenty-three rays, in the pectoral fin fourteen, and in the tail ten.

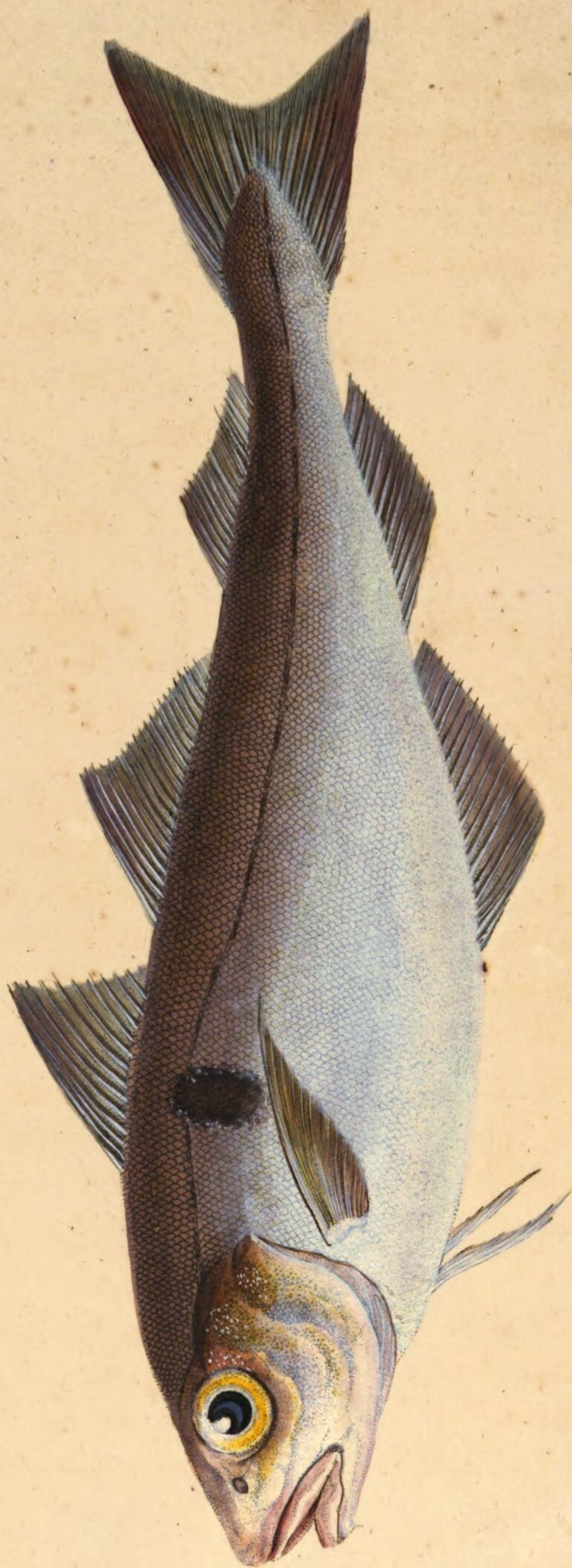


PLATE LIX.

GADUS AEGLEFINUS.

HADDOCK.

* PISCES JUGULARES.

GENERIC CHARACTER.

Head smooth. Seven slender rays in the branchiostegous membrane. Body oblong. Scales deciduous. All the fins covered with a skin. More than one dorsal and anal fin; rays unarmed. Ventral fin slender, pointed.

SPECIFIC CHARACTER

AND

SYNONYMS.

Whitish, tail forked: upper jaw longest.

GADUS AEGLEFINUS: albicans, cauda biloba, maxilla superiore longiore. *Linn. Fn. Suec.* 306.—*Gmel. Syst. Nat.* 1159. *sp.* 1.

Gadus Kolja. *It scan.* 325.—Gadus dorso tripterygio, ore papilloso. *It. Wgoth* 178.

Gadus dorso tripterygio, ore cirrato, corpore albicante, maxilla superiore longiore, cauda parum bifurca. *Art. Gen.* 20. *syn.* 36. *spec.* 64.

PLATE LIX.

Callarias barbatus ex terreo albicans, in lateribus macula nigra, cauda parum divisa, mandibulis minutis, sed acutissimis dentibus asperis. *Klein miss. pisc. 5. p. 6. n. 2.*

Aeglefinus *Bellon. aq. p. 127.*

Asellus major *Aldrov. pisc. p. 282.*

Callarias Asellus minor. *Jonst. de pisc. p. 1. t. 1. f. 1.*

Gadus cirro unico, linea laterali nigra. *Bloch Fisch. Deutschl. 2. p. 138. t. 62.*

AIGREFIN, & EGLEFIN. *Belon. 118. &c.*

HADOCK. *Will. Ichth. 170.—Raii Syn. pisc. 55.—Penn. Brit. Zool. 3. p. 179.*

At a certain season of the year, the Haddocks assemble together in immense shoals in the Northern seas, preparatory to their annual migrations to the southward, in the course of which they visit the coasts of the British Isles. Some short time after their appearance in the German sea, they are equally abundant upon the coasts of Sweden, Denmark, and Holland, as on the shores of Britain, but after passing down the channel to the southward, as far as the coast of France, it is not certain that they proceed any further in that direction. It has been observed, that in those periodical migrations which take place in the winter season, about the end of November, or beginning of December, that it never enters the Mediterranean: neither does it appear in the Baltic, or even pass the sound towards that sea: Copenhagen, and other markets on the coast of the Baltic, and also Hamburgh, being supplied with the Haddock by the fishermen, who take them in vast quantities in the sea, off Heiligeland.

PLATE LIX.

The winter is the most productive season for the Haddock fisheries, because, at that time, the Haddock may be taken in great abundance in our seas; it is also common at most other seasons, on our coasts, for it may be named among the small number of fishes, that is constantly brought for sale throughout the year, to the London markets.

The Haddocks are in full roe at the time of their arrival in December*, nature having directed them to seek a milder region than that which they inhabit in summer, as the winter approaches, in order to deposit their spawn. The old fishermen affirm, that the females appear in shoals upon the coast, which after laying their eggs, are followed to the same places by shoals of the males, who immediately proceed to fecundate the eggs deposited by the former.

* "The grand shoal of Haddocks," Mr. Pennant tells us, "comes periodically on the *Yorkshire* coasts. It is remarkable that they appeared in 1766, on the 10th of December, and exactly on the same day, in 1767: these shoals extended from the shore, near three miles in breadth, and in length from *Flamborough* head, to *Tinmouth* castle, and perhaps much further northwards. An idea may be given of their numbers, by the following fact: three fishermen, within the distance of a mile from *Scarborough* harbour, frequently loaded their *coble*, or boat, with them twice a day, taking each time about a ton of fish: when they put down their lines beyond the distance of three miles from the shore, they caught nothing but dog fish, which shows how exactly these fish keep their limits."

"The best Haddocks were sold from eight-pence, to a shilling per score, and the poor had the smaller sort at a penny, and sometimes a halfpenny per score."

"The large Haddocks quit the coast as they go out of season, and leave behind great plenty of small ones. It is said, the large ones visit the coasts of *Hamburgh*, and *Jutland*, in the summer."

PLATE LIX.

Haddocks of a large size are only esteemed good for the table during the winter: those of a small size, before they begin to breed, are considered in perfection at all times, but these even are best in winter. The flesh of this fish when boiled, is not so firm as that of the Cod, to which it must also yield in the excellence of flavour; some, however, think it preferable. When salted, and cured like the Cod, the Haddock is by no means indifferent eating. Sometimes the Haddock attains to the length of three feet, one of which size in good condition, will weigh about fourteen pounds, but these are deemed much inferior to those of about half the size, or eighteen inches in length.

Upon the first approach, or appearance of a storm, the Haddock sinks to the bottom of the sea, to seek shelter till the danger is over, and when they again appear near the surface, on the return of fine weather, they are observed to have their backs soiled with mud, or sea weeds, and other marine refuse lodged at the bottom of the water. In the North seas, the fishermen are most successful in their fisheries for the Haddock in the night time, those fishes lurking at the bottom of the sea in the day time, but rising near the surface, as the evening closes, in quest of food.

The same mode of capture is pursued for the Haddock, as is adopted in the cod fisheries. They lay down in the water several lines of considerable length, to which a number of hooks are suspended, at proper distances from each other: the most tempting bait for the Haddocks, are pieces of the herring, a fish of which they are remarkably fond, for it is in pursuit of the herrings often-times, as is well known, that the Haddocks are met with in such immense shoals traversing the ocean.

PLATE LIX.

Dr. Bloch is of opinion, that the black or dusky colour of the lateral line, in addition to the little cirrus, or beard, at the lower jaw, is a sufficient specific criterion of the Haddock. There is also another very remarkable character of the Haddock, a large square black or dusky spot on each side of the body, near the head, or a little below the first dorsal fin, from whence, in the legends of credulous devotion, it has been admitted to be the same fish, as St. Peter caught with the tribute money in its mouth. The two spots are considered as the mark of St. Peter's thumb and finger, which has ever since remained impressed on the sides of the whole race of Haddocks, to perpetuate the circumstance. But the Haddock is not without a rival, in this mark of reputed sanctity: the sides of the Dory being even more distinctly marked, than those of the Haddock.

There are three fins on the back of this fish, the first containing in the specimen we examined for this purpose, fourteen rays: second, twenty six rays: third, eighteen rays; pectoral fin nineteen rays, and ventral six rays. There are also two anal fins, the first containing twenty-two rays, the second twenty, and the tail forty-one. It should be observed, that Linnæus in *It. Wgoth*, speaks of a Haddock, with only twenty-three rays in the tail, and Bloch of another, with twenty-seven.

PLATE IX.

Dr. Bloch is of opinion that the black or dusky color of the lateral line, in addition to the line of the jaw, is also a sufficient evidence of the Haddock. There is also another very remarkable character of the Haddock, a large square black or dusky spot on each side of the body near the head, or a little below the first dorsal fin, from whence, in the juveniles of the genus, it has been supposed to be the same fish, as in the Haddock. It has been noticed in its mouth. The two spots are considered as the marks of the Haddock's thumb and finger, which has given rise to the name of the Haddock. The Haddock is not without a rival, in this mark of respect, and the sides of the body being even more distinctly marked, than those of the Haddock. There are three lines on the back of the fish, the first consisting in the specimen is exhibited for this purpose. The second and third rays, and the first dorsal and ventral rays. There are also two anal fins, the first containing twenty-two rays, the second twenty, and the third ten. It should be observed that the Haddock is a species of a Haddock, with only twenty-three rays in the first, and black of another, with twenty-seven.

PLATE IX.

EXCHINUS PINICOLA.

FIGURE 1.



From the collection of the U.S. National Museum.

EXCHINUS PINICOLA. - *Proc. Acad. Nat. Sci. Phila.* 1880, p. 125, fig. 1, 2.

Notes. - See also p. 125, fig. 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.



PLATE LX.

CYPRINUS PHOXINUS.

MINOW.

* PISCES ABDOMINALES.

GENERIC CHARACTER.

Mouth without teeth: gill-membrane with three rays: body smooth, and whitish in general: ventral fins usually with nine rays.

SPECIFIC CHARACTER

AND

SYNONYMS.

Anal fin with eight rays: upon the tail a dusky spot: body pellucid.

CYPRINUS PHOXINUS: pinna ani radiis 8, macula fusca ad caudam, corpore pellucido. Müll. prodr. Zool. dan. p. 50. n. 430.—Gmel. Linn. Syst. Nat. p. 1422. sp. 10.

CYPRINUS PHOXINUS. Bloch Fisch. Deutschl. 1. p. 6. n. 12. t. 8. f. 5.

Minow. Ray Pisc. p. 125.

Penn. Brit. Zool. 3. p. 318. n. 11.

PLATE LX.

This pretty little fish is frequent in many of our fresh water streams that flow over a gravelly bottom, during the summer; keeping together in large shoals, and swimming very near the surface of the water. Old Walton tells us that the Minow, or Penk, (Pink) is not easily found and caught till March, or April, for then it appears first in the river, nature having taught it to shelter and hide itself in the winter time in ditches near the river, both for the sake of security, and to keep itself warm in the mud, or amongst the weeds.

“ The Minow (says this writer in another place) hath, when he is in perfect season, and not sick, which is only presently after spawning, a kind of dappled or waved colour, like to a panther, on his sides, inclining to greenish and sky colour, his belly being milk white, and his back almost black, or blackish. He is a sharp biter at a small worm, and in hot weather makes excellent sport for young anglers, or boys, or women that love that recreation, and in the spring they make of them excellent minow-tansies; for being washed well in salt, and their head and tails cut off, and their guts taken out, and not washed after, they prove excellent for that use; that is, being fried with yolks of eggs, the flowers of cowslips, and of primroses, and a little tansy; thus used, they make a dainty dish of meat.”

In a note likewise under the history of the Perch, in the last edition of the Complete Angler, we are told, that the largest perch are taken with a minow, hooked with a good hold through the back-fin, or rather through the upper-lip, as the perch, from the structure of his mouth, cannot take the bait cross-wise like the pike. The Minow is well known to be an excellent bait for the latter fish also, and likewise for the trout, both which fishes, together with the perch, are the greatest enemies of the Minow.

PLATE LX.

The Minow feeds on aquatic plants and worms, and is remarkably prolific. It is a small kind, scarcely ever exceeding the length of three or four inches. Both sexes are represented in the annexed Plate. In point of number, the rays in the fins nearly accord in both. The dorsal fin contains eight rays: pectoral ten rays: ventral seven rays: anal eight: and the caudal, nineteen.

PLATE IX.

The Minnow feeds on aquatic plants and worms, and is remarkably prolific. It is a small kind, scarcely ever exceeding the length of three or four inches. Both sexes are represented in the annexed plate. In point of number, the rays in the fins nearly accord in both. The dorsal fin contains eight rays; pectoral ten rays; ventral seven rays; anal eight; and the caudal, nineteen.

PLATE

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8



PLATE LXI.

SALMO ALPINUS.

ALPINE SALMON.

*** PISCES ABDOMINALES.

GENERIC CHARACTER.

Head smooth, and compressed. Mouth large : lips small : tongue white, cartilaginous, and moveable : teeth in the jaws, and upon the tongue. Eyes moderate, and lateral. Branchiostegous membrane with from four to twelve rays ; cover of three plates. Body long, covered with rounded and very finely striated scales : back convex : lateral line straight, and nearest to the back : posterior dorsal fin fleshy without rays : ventral fin of many rays.

SPECIFIC CHARACTER

AND

SYNONYMS.

Back black, sides blue ; belly fulvous.

SALMO ALPINUS : dorso nigro, lateribus cæruleis, ventre fulvo.

Linn. Fn. Suec. 349.—*Gmel.* 1370. *sp.* 8.

Salmo vix pedalis pinnis ventris rubris, maxilla inferiore paulo longiore.

Arted. Gen. 13. *syn.* 25. *sp.* 52.

CHARR. *Pen. Brit. Zool.* 3. *p.* 265.

PLATE LXI.

The lake Winander Mere, in the county of Westmoreland, has more than once afforded us specimens of this rare and very local fish, *Salmo Alpinus*, in the highest state of perfection, in the winter season: at which time they are in full spawn. The fishermen on this lake only take them at this season of the year, when they appear in plenty near the shores of this extensive water. The potted Charr of Westmoreland is esteemed an article of luxury for the table. When dressed in the usual manner like trout this fish is also excellent.

The individual Charr delineated, measures eleven inches and a half from the point of the jaw to the extremity of the tail. In the first dorsal fin, there are eleven rays: the pectoral fin contained sixteen rays: ventral eleven: anal ten: tail twenty-four. Its colours are represented from the fish recently taken. Among several specimens we examined, a material difference prevailed in the exact tints of the colour. In one the gills were faintly speckled with darker colour than in the present; and the belly of another inclined more to silver. All these, however, we have no doubt of being the gilt Charr of Pennant.

Great confusion prevails among the synonyms of *Salmo Alpinus*, and the other analogous species *Salvelinus*, *Salmarinus*, and the ambiguous *Carpio* of Artedi. The writers of our own country have by no means succeeded in unravelling the perplexity, which induces us to reject with caution much that has been said concerning them. We shall hereafter treat of *Salmo Salvelinus*, as a British fish, when this interesting subject, the natural history of the Charrs, will be considered with more attention.

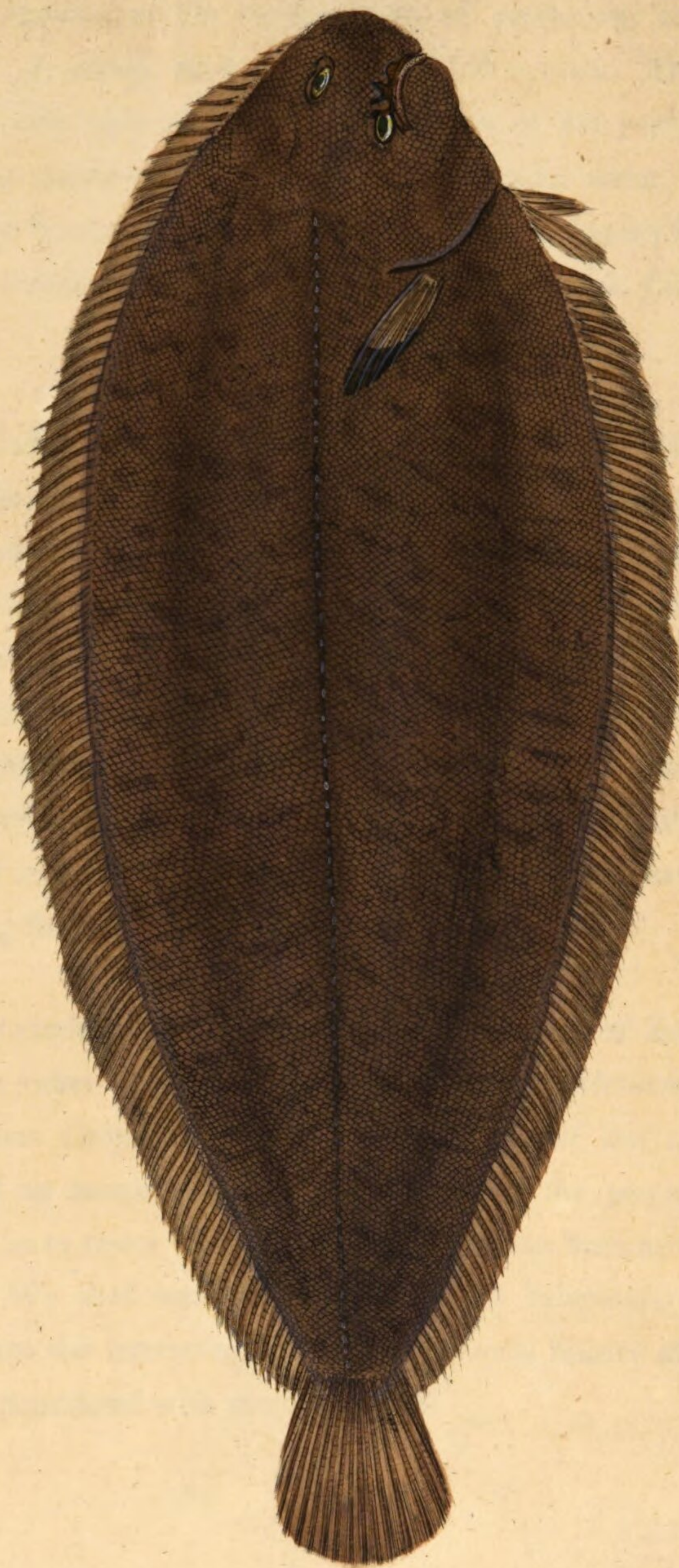


PLATE LXII.

PLEURONECTES SOLEA.

COMMON SOLE.

* PISCES THORACICI.

GENERIC CHARACTER.

Head small. Eyes spherical, both on the same side of the head, and near each other. Mouth arcuated. Jaws dentated, unequal. Gill-membrane with from four to seven rays. Gill-covers of three plates in general. Body compressed, carinated; upper side sub-convex: beneath flat and pale. Vent near the head.

SPECIFIC CHARACTER

AND

SYNONYMS.

Body oblong, rough: lower jaw longest.

PLEURONECTES SOLEA: corpore aspero oblongo maxilla superiore longiore. *Linn. Fn. Suec.—Gmel. Syst. Nat.* 1232. sp. 9.

Pleuronectes Tunga. *It. Wgoth.* 178.

Pleuronectes maxilla superiore longiore corpore oblongo, squamis utrinque asperis. *Art. Gen.* 18. *Syn.* 32. *spec.* 60.

PLATE LXII.

Pleuronectes squamis asperis, maxilla superiore longiore. Bloch.

Fisch. Deutschl. 2. p. 42. n. 4.

Pleuronectes solea, corpore aspero oblongo, maxilla superiore longiore, oris latere albo cirroso. Brün. pisc.

mass. p. 34. n. 47.

Solea squamis minutis. Klein. miss. pisc. 4. p. 31. n. 1.

Solea. Plin. Hist. Mund. lib. 19. c. 16, 20.

Tungen. Schonevelde. 63.

La Sole. Belon. 142. &c.

Buglossus. Rondel. 320.—Gesn. pisc. 666.

Buglossus, the Sole. Will. Ichth. p. 100.

SOLE. Penn. Brit. Zool. 3. p. 231. sp. 107.

This common Fish is readily distinguished from all the other species of the *Pleuronectes* tribe, by the oblong form of the body, the roughness of the scales, and the protrusion of the lower jaw beyond the upper one, as Linnæus mentions. The mouth is besides fringed on the side with very fine cirri. Above, the colour is an olivaceous brown, sometimes dark, and obscurely spotted with black: specimens do occasionally occur, in which the black spots are intermixed with others of a pale grey, or whitish hue. The tip of the pectoral fin on the upper side is black. Under surface of the fish dull white,

Except the turbot, the Sole is held deservedly in much greater estimation for the table than the other kinds of flat fish, and is by many considered superior even to that of the turbot. The flesh is firm and white, and when in high perfection, of a most delicious flavour.

PLATE LXII.

The quality of this fish appears to vary with the nature of its food, for we cannot otherwise account for the difference in the Soles caught at the same season of the year, on different parts of our coasts. The old fishermen affirm, that the far greater number of the soles resort to particular spots or beds in the sea, in which they trawl with more success than upon any other. They further say, that the fish which haunt particular spots, differ from those they find elsewhere in quality; sometimes they are much superior, both in size and goodness, and at others greatly inferior, which seems undoubtedly to depend upon the nature of the food, that attracts them to those particular haunts. Even the Soles found in the same place in the following season, does not invariably prove of the same quality, as those caught before. Thus for instance, in the London markets, the fishmongers make the distinction of Brighton Soles, Brixham Soles, West country Soles, Thames Soles, Slips, &c. When a new bed, or haunt of Soles, happens to be discovered, samples of the fish are transmitted to the markets, in order, by trial, to ascertain the relative goodness of the sort, which not always depending upon the size, cannot otherwise be well determined. A kind of criterion is thus established, by means of which even the fluctuating price of this article is in a certain measure governed afterwards. The Brighton Soles brought by land carriage have maintained the superiority for some years past in the London markets.

The most considerable fisheries for the Soles is carried on upon the western coasts, where they are found of a much larger size than on any other part of our coasts. These, we are informed, are not unfrequently taken of five or six pounds weight. Pennant speaks of them even rather larger. It is remarkable, that upon the eastern coast they are rarely taken of a size by any means so considerable; seldom,

PLATE LXII.

if ever, exceeding a pound, or a pound and a half in weight. About three years ago, a bed of very large Soles was however found at a distance from land in the Yorkshire sea: they were remarkably fat, but soft, and of an indifferent flavour. Soles of an excellent quality are found on the sandy shores of the Severn, and other coasts of Wales, but they are generally of the middle size. The Bristol market is supplied chiefly with the Soles caught in the Severn sea. Thames Soles are very delicate; the Slips are only those of a small size, seldom exceeding five or six inches in the length, and differing a little in the elongated form of the outline, a variation to which Soles are often liable. The excellent flavour of the Sole has obtained it the name of *Perdix de Mer* with the French.

This is a general inhabitant of various parts of the world, being found in the North, and Baltic seas: in the Mediterranean, and also those of both North, and South America. It delights in a fine shallow, sandy bottom, and feeds on eggs of other fish, on crabs, and testaceous vermes, or shell-fish. They are commonly taken with other flat fish in the trawling net.

The dorsal fin, in the specimen we have represented, contains ninety-seven rays: pectoral fin ten: ventral eight: anal eighty-three: caudal seventeen. The number of rays in the fins of the Sole, it should be observed, are extremely liable to vary; for instance, Linnæus describes one with seventy-one rays in the dorsal fin: another mentioned by Bloch, had eighty rays in that fin; and a third by Artedi, ninety-one; the number of rays in all the other fins, differed likewise materially.



PLATE LXIII.

CENTRISCUS SCOLOPAX.

SNIFE, OR TRUMPET FISH.

***** PISCES BRANCHIOSTEGI.

GENERIC CHARACTER.

Head produced into a very narrow snout: mouth without teeth, lower jaw longest. Aperture of the gills repandate. Body compressed: abdomen carinated. Ventral fins united.

SPECIFIC CHARACTER

AND

SYNONYMS.

Body scaly, and rough: tail straight, and extended.

CENTRISCUS SCOLOPAX: corpore squamoso scabro, cauda recta extensa. *Gron. Zooph. p. 128. n. 395.—Gmel.*

Syst. Nat. T. 1. p. 3. p. 1461. sp. 2.

Balistes *Scolopax* pinna dorsali anteriore quinqueradiata, rostro longissimo maxilla inferiore operculato. *Linn. Syst.*

Nat. X. I. p. 329. n. 8.

Balistes aculeis 2. loco pinnarum ventralium, solitario infra anum.

Art. Gen. 54. syn. 82.

Centriscus scolopax. *Bloch auf. Fisch. I. p. 55. n. 1. t. 123. f. 3.*

PLATE LXIII.

Meerschnepf, and Schneppenfisch. *Germ.*—Bécasse, *Fr.*

Trumpet, or Bellow's-fish. *Will. ichth. p. 160. t. 1. I. 25. f. 2.*

Raj. pisc. 50.

CENTRISCUS SCOLOPAX.

SNIFE OR TRUMPET FISH.

Centriscus Scolopax is to be considered as one of the most choice of our British fishes. Mr. Pennant never met it, nor does he mention it on the authority of any other observer in the British Zoology. We are acquainted with one or two, if not more, well authenticated instances of its having been observed upon the western coasts of England, about Devonshire and Cornwall. In the adjacent seas, to the southward, this curious fish becomes rather common, especially towards the coast of France, where the fishermen distinguish it by the name of *Bécasse*, and *Bécasse de Mer*, the Snipe fish, or Sea Snipe. And again, in the Mediterranean sea it is more abundant still, being commonly brought with other fish to the markets for sale. The flesh of this species is very palatable, and wholesome, according to the accounts of those who have visited the south of Europe, and eaten of them, but being small they are esteemed of little value.

This is a fish of singular conformation; nor is it, in our opinion, more remarkable for its singularity than its uncommon share of elegance. It scarcely ever exceeds the size of our figure. The whole body is covered with rigid, pointed scales. Its colour is variable, from a pale red to a purplish, or sanguineous colour, and in one of two specimens in our collection the sides, and abdomen, are glossed with a rich yellow, or golden colour.

PLATE LXIII.

Although this fish be not of the voracious kind, which the structure of its elongated jaw must render impossible, it may prove itself on some occasions a formidable enemy to other fishes of a diminutive size, being capable of inflicting a grievous wound with the strong serrated bony spine, or process, which constitutes the first ray of the anterior dorsal fin. Besides this spine, the same fin contains three other rays of a bony texture, but these are slender, and, comparatively to the former, very small. The rays of the second dorsal fin are soft, and amount to nine in number: in the pectoral fin are fifteen rays; ventral seven; anal thirteen; and caudal fifteen.

Although this fish be not of the voracious kind, which the structure of its elongated jaw must render impossible, it may prove itself on some occasions a formidable enemy to other fishes of a diminutive size, being capable of inflicting a grievous wound with the serrated bony spine, or process, which constitutes the first ray of the anterior dorsal fin. Besides this spine, the same fin contains three other rays of a bony texture, but these are slender, and comparatively to the former, very small. The rays of the second dorsal fin are soft, and amount to nine in number; in the pectoral fin are fifteen rays; ventral seven; anal thirteen; and caudal fifteen.

The body of this fish is covered with small scales, and is of a brownish grey color, with a lighter shade on the sides. The head is small, and the eyes are large. The mouth is small, and the jaw is elongated. The gills are small, and the operculum is large. The pectoral fins are small, and the pelvic fins are large. The anal fin is small, and the caudal fin is large. The dorsal fin is small, and the ventral fin is large. The fish is of a moderate size, and is found in the sea.

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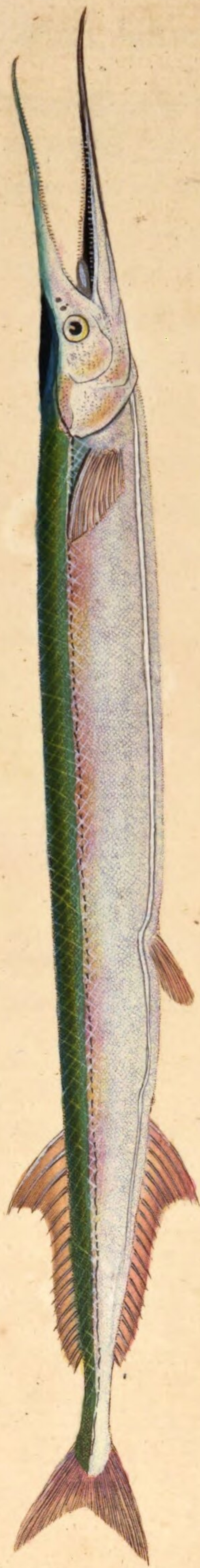


PLATE LXIV.

ESOX BELONE.

SEA PIKE, OR GAR-FISH

*** PISCES ABDOMINALES.

GENERIC CHARACTER.

Head flattish above: mouth and throat large: jaws toothed, unequal, the upper one flat, lower punctated: tongue broad, loose; palate smooth: eyes round, moderate size, and lateral: nostrils double, near the eyes. Gill-covers large, aperture ample, with from seven to twelve rays. Body elongated, covered with hard scales, above convex, and compressed on the sides: lateral line straight, nearest the back, and scarcely visible: dorsal and anal fin very short, and placed opposite.

SPECIFIC CHARACTER

AND

SYNONYMS.

Each jaw long, and subulate.

ESOX BELONE: rostro utraque maxilla subulato. *Gmel. Syst. Nat.*

T. 1. p. 3. p. 1391. sp. 6.

Esox rostro cuspidato gracili subtereti spithamali. *Linn. Fn.*

Suec. 356.—Art. Gen. 10. Syn. 27.

PLATE LXIV.

Esox rostro subulato. Bloch Fisch. Deutschl. I. p. 236.

SEA PIKE, GAR-FISH, or SEA NEEDLE. *Penn. Brit. Zool.*
v. 3. p. 324. No. 154

The *Esox Belone*, or Gar-fish, of the English, is a common species in all the European seas; migrating annually in large shoals from the depths of the ocean to the shore. They appear on our coasts in the spring, commonly announcing the arrival of the mackrel, but remaining with us for a much shorter length of time than that fish. They deposit their spawn close to the shore, among the rocks, and sea weeds, where the young are hatched, and after a certain time retire. We have seen the young fry of this fish on several of our coasts during the summer months.

As an article of food the Gar-fish is held in far less estimation than the Mackrel, to which its flavour in some degree approaches. By many people the flesh of this fish is considered unwholesome, and even poisonous, no doubt from an unfounded prejudice against it, arising from the singular circumstance of the bone becoming of a fine grass-green colour in boiling. In Holland they are taken in vast quantities, but are seldom eaten, being most frequently employed as bait in the cod fisheries by the Dutch fishermen.

The usual size of the Gar-fish on our coasts, is from a foot to eighteen inches, or two feet in length: sometimes they may attain to three feet in length, but that very rarely. According to Renard this fish is found, at times, in the eastern parts of the world eight feet

PLATE LXIV.

long. Dr. Bloch was told by Sir William Hamilton, that a fish of this species was once caught near Naples, that weighed fourteen pounds, and this being an uncommon size for the Gar-fish on that coast was presented to the King as a rarity.

The dorsal fin in our specimen contains seventeen rays: pectoral thirteen: ventral seven: anal nineteen: and caudal twenty-three.

PLATE LXIV

long. Dr. Bloch was told by Sir William Hamilton, that a fish of this species was once caught near Naples, that weighed fourteen pounds, and this being an uncommon size for the Gar-fish on that coast was presented to the King as a rarity.

The dorsal fin in our specimen contains seventeen rays: pectoral thirteen: ventral seven: anal nineteen: and caudal twenty-three. The head is covered with small scales, and the body is covered with larger scales. The scales on the head are small and close, and the scales on the body are larger and more loosely set. The scales on the head are small and close, and the scales on the body are larger and more loosely set. The scales on the head are small and close, and the scales on the body are larger and more loosely set.

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PLATE LXV.

ACIPENSER STURIO.

COMMON STURGEON.

***** PISCES CHONDROPTERYGII.

GENERIC CHARACTER.

Head obtuse. Mouth beneath the head, retractile, toothless: cirri four, placed under the snout, and before the mouth. Aperture of the gills on each side. Body elongated, with numerous plates, disposed in series along the angles of the body.

SPECIFIC CHARACTER

AND

SYNONYMS.

Snout obtuse: transverse diameter of the mouth equal to its length: beards on the snout nearest the tip: lips bifid.

ACIPENSER STURIO: rostro obtuso, oris diametro transverso longitudini æquali. *Güldenst. nov. comm. Petrop.* 16. p. 532.—*Gmel. Linn. Syst. Nat. T. I.* p. 3. p. 1483. sp. 1.

Acipenser cirris 4. squamis dorsalibus 11. *Linn. Syst. Nat.—Mus. Ad. Fr. &c.*

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*Acipenser corpore tuberculis spinosis exasperato. Art. gen. 65.
synn. 91. Fn. Suec. 27.*

*Acipenser cirris 4, corpore tuberculorum spinosorum seriebus quin-
queangulo, rostro subacuto. Gron. mus. 1. p. 60.
n. 131. Zooph. p. 39. n. 140.*

Sturio sive Silurus. Salv. aq. 11.

*Acipenser scutorum ordinibus quinque ad corpus asperum. Bloch
Fisch. Deutschl. 3. p. 89. n. 1. t. 88.*

STURGEON. Brit. Zool. 3. p. 127. Pl. XIX.

The largest Sturgeon perhaps ever caught in the rivers of this country, is that mentioned by Mr. Pennant to have been found in the river Esk some years ago, which weighed four hundred and sixty pounds. Those of a smaller size, namely, from forty to fifty, or sixty pounds, are not by any means common, but when they attain to above an hundred pounds in weight they are certainly scarce. About twelve months ago a Sturgeon, weighing one hundred and thirty-one pounds, was caught in the river Maldon, near the Bucleigh Mills, and this stands recorded as a very remarkable incident.

A Sturgeon of five hundred and fifty pounds weight, caught in one of the Italian rivers in the year 1750, was esteemed so great a rarity, according to Bloch, that the Duke de Carpinetto, who received it, made a present of it to the Pope. In the northern parts of Europe, Sturgeons even of this enormous size do not appear to be remarkably uncommon. In some of the Norwegian rivers, and in Siberia, we are told the Sturgeon grows to such a vast size, that the roe alone

PLATE LXV.

taken from a single fish will sometimes weigh from two to three hundred pounds ; and were we to give implicit credit to the assurances of some writers, we might even suppose that Sturgeons are taken at times in those parts of a thousand pounds weight each.

In all the northern parts of the world the Sturgeon fishery seems to be considered as an object of the greatest consideration. In the north of Europe, Asia, and America, there are regular fisheries for them. In Russia the principal season for taking them, as Pallas acquaints us, is in the depth of winter, when the natives assemble at a stated period, and breaking through the ice, take them in great abundance from the rivers, with the assistance of spears, or harpoons, and long poles furnished with hooks at the extremity. The flesh of the Sturgeon is excellent, and is eaten either fresh, salted, or pickled in a peculiar manner. In this latter state it constitutes an article of extensive and lucrative commerce with those countries where the Sturgeon is less plentiful ; as does likewise the caviare, three different kinds of which they prepare from the roe of this fish.

The Sturgeon is a creature of a sluggish, quiet, nature, alternately inhabiting the fresh waters, and the sea, and subsisting on the smaller kinds of fish. It has been observed, that those Sturgeons which have remained during the winter in the fresh waters return again to the sea on the approach of summer. This appears to be contrary to their usual course, for they commonly ascend the rivers in the spring after remaining in the sea all the winter.

In our fish the dorsal fin contains thirty-five rays : pectoral fin twenty-eight : ventral fin twenty-four : anal twenty-three, and the tail one hundred and twenty-five.

PLATE LXV

... from a single fish will sometimes weigh from two to three hundred pounds; and were we to give any idea of the assurance of some of them, we might even suppose that they were taken at times in those parts of a thousand pounds weight.

In all the northern parts of the world the Salmon is the most common and valuable fish. In the north of Europe, Asia, and America, there are regular fisheries for it. In Russia the principal reason for taking them, as I have said, is in the month of winter, when the natives assemble at a great number of places, and passing through the ice, take them in great abundance from the rivers, without the assistance of spears, or harpoons, and the fish of the country is much improved with food at the extremity. The fish of the country is excellent, and is eaten either fresh, salted, or pickled in a peculiar manner. In this last case it is preserved in a state of fermentation and is much more valuable than the other. It is also used in the preparation of the most delicious of wines, and is the principal article of the diet of the natives.

The Salmon is a fish of great size, and is found in the most northern parts of the world. It is also found in the most southern parts of the world, and is the most common and valuable fish in all the world. It is also found in the most northern parts of the world, and is the most common and valuable fish in all the world. It is also found in the most southern parts of the world, and is the most common and valuable fish in all the world.

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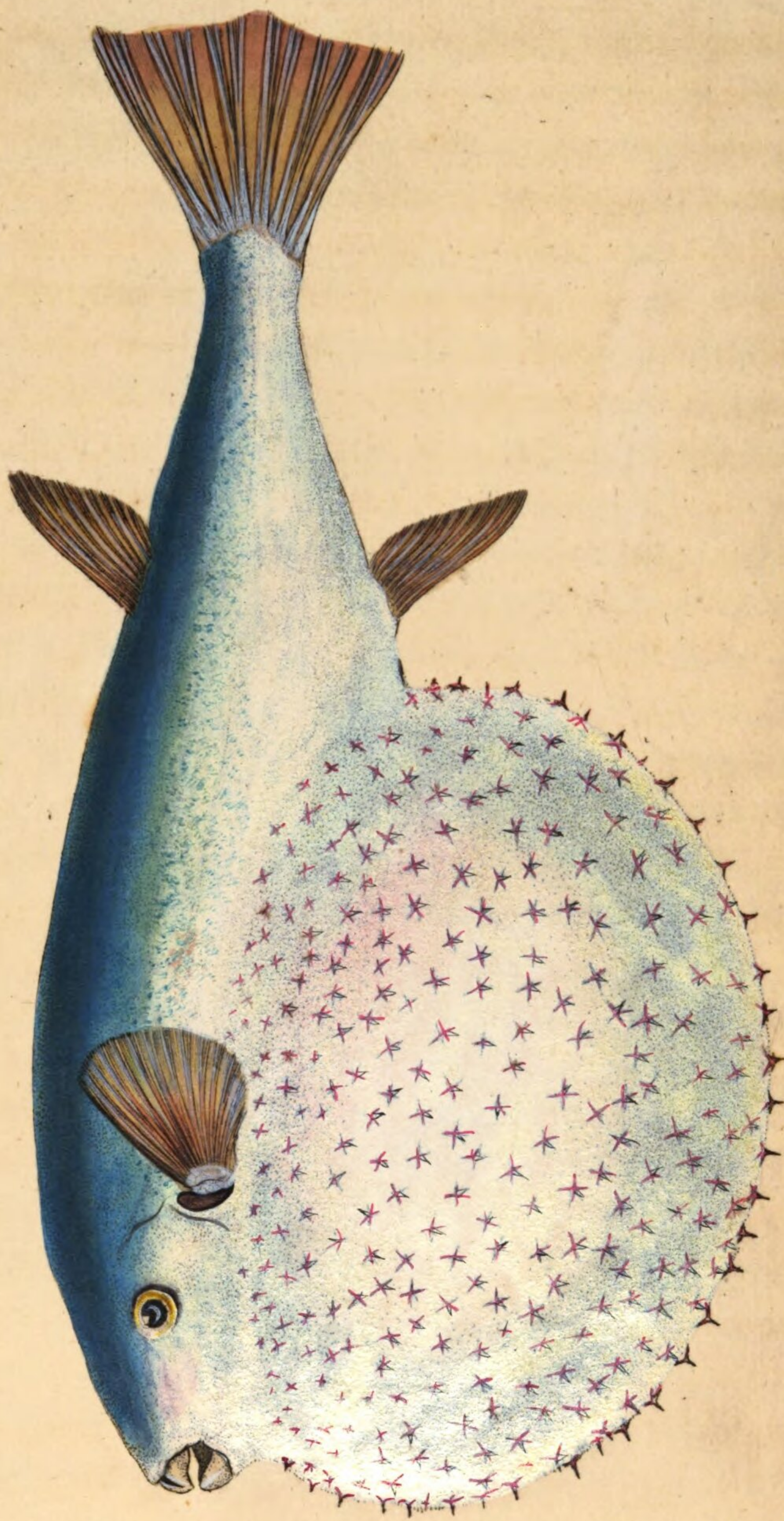


PLATE LXVI.

TETRODON STELLATUS.

STELLATED GLOBE-FISH.

**** PISCES BRACHIOSTEGI.

GENERIC CHARACTER.

Jaws bony, extending, divided at the tip: aperture of the gills linear: body muricated beneath: no ventral fins.

SPECIFIC CHARACTER

AND

SYNONYMS.

Body above blue, beneath silvery: abdomen spinous, each spine arising from a stellated root, of four rays.

TETRODON STELLATUS: supra cœruleus subtus argenteus, abdomine aculeato: aculeorum radicibus stellatis quadri-radiatis.

Globe Diodon. *Penn. Brit. Zool. v. 3, p. 132. sp. 56.*

The stellated Globe-fish, is one of the most singular creatures of the finny tribe hitherto detected in the British seas. A fish of this curious kind is described by Pennant in the British Zoology as a

PLATE LXVI.

species common to Europe, and South Carolina. "As yet," observes Mr. Pennant, "only a single specimen has been discovered in our seas; taken at Penzance in Cornwall." To this we may add another instance within our more immediate knowledge, of its being captured in the British seas: about the year 1779, some short time after the publication of the British Zoology, a very fine fish of this sort was caught on the Cornish coast, and communicated to Mr. George Humphrey, of Saville House, Leicester Square. This specimen was afterwards obtained by Mr. John Hunter, Surgeon, in whose Museum the fish, very finely preserved in spirits, remains at this time *. It is about eighteen inches in length, and when first taken was remarkable for the uncommon brilliancy of its colours according to the testimony of those who saw it at that time: the back was of the finest ultramarine blue imaginable, the whole under surface of a resplendent silver, and the belly beset with spines of a rich carmine colour, which seemed to derive still greater beauty from the admirable contrast of the silvery surface upon which they were disposed. We are in possession of a third specimen that has been caught in the European seas, that exactly corresponds with the above, but we have not hitherto been so fortunate as to obtain a British specimen.

After perusing the description which Mr. Pennant leaves us of this fish, we must really confess our astonishment, that any ichthyologist could possibly remain in doubt as to the identity of the species that author means by his *Globe Diodon*. Mr. Pennant, it is true, considers his fish as the *Tetrodon lævigatus* of Linnæus, in which respect he is mistaken, but in other particulars his description of the

* This fish has the abdomen cut open to shew the structure of the internal organs, by means of which the creature has the power of inflating the external skin of the abdomen at pleasure, like a bladder, to a prodigious size.

PLATE LXVI.

fish is pretty accurate, and may be generally relied upon. In stating this we dissent entirely from the opinion entertained by another naturalist of no mean celebrity in the science of ichthyology, the ingenious Dr. Bloch of Berlin. This writer treats the account given by our English naturalist with unmerited severity. He dwells on the subject of the *Globe Diodon* with much critical animadversion, and labours to prove that the fish Mr. Pennant means, is not the *Tetrodon lævigatus* of Linnæus, but the Linnæan *Tetrodon Lagocephalus*; but with what success we shall consider hereafter. His remarks on this topic are curious, and cannot be better expressed than in his own words. "M. Pennant (says that writer) rapporte à not repoisson le lævigatus de Linné; mais en comparant son dessein avec la description que Linné donne de ces deux poissons, on voit que son poisson est le notre, ou le lagocephalus de Linné; car chez le lævigatus, il n'y a que la partie anterieure du ventre qui soit garnie de pointes. Il lui donne aussi deux dents au lieu de quatre *."

But it appears from hence that Dr. Bloch has presumed too far. He even affords us reason to suspect, from this and various other passages in his work, that he has ventured to criticise upon the observations of a writer whose language he was at best but imper-

* In the latter part of this observation Dr. Bloch is right; the jaws and teeth are far from well expressed in Pennant's plate, a circumstance that may have arisen from an oversight in the artist, as well as the author. In all the specimens of this fish that we have seen, the beak is cleft at the apex, both of the upper and lower mandible, and by that means each is divided into two distinct teeth, but in Pennant's figure, the mandibles appear entire, as if the fish were furnished with only a single tooth instead of two in each jaw. This cleft being one of the principal characteristics of the genus *Tetrodon*, must have been evidently overlooked by Mr. Pennant.

P L A T E L X V I.

fectly acquainted with. We cannot otherwise account for his misconception of almost every characteristic by which Pennant distinguishes his fish : and which he must have misconceived, or entirely overlooked when he concluded so positively that fish, and his lagocephalus were the same species. To the eye of an experienced naturalist nothing can appear more dissimilar than the Lagocephalus of Bloch, and the Globe Diodon of Pennant. There is one remark of the latter writer especially, that ought to be observed ; and which, if it had not escaped the notice of Bloch, must have convinced him he was himself mistaken as to Pennant's fish :—when speaking of the abdominal spines of the Globe Diodon, this writer tells us, in language the most decisive, that the belly of his fish “ was beset with innumerable small sharp spines adhering to the skin by *four processes**.” How then could Bloch conceive his Lagocephalus to be the same fish, when he as plainly informs us, the spines in his fish adhere to the skin by means of *three processes* instead of four ?—“ Les étoiles (says he) sont disposées en vingt lignes à demi-cercles : chacune est formée d'un piquant-qui est posé sur trois racines,” and yet this ingenious ichthyologist, overlooking such a striking specific distinction of the two species, concludes that the Pennantian fish must be his Lagocephalus !—Dr. Shaw has inadvertently adopted this erroneous conclusion, apparently from Bloch, in his General Zoology, and at the same time encreases the confusion, by blending in detail, the history and description of the true Lagocephalus, with the remarks of Pennant on the Globe Diodon.

By attending to the diverging processes at the base of the abdominal spines, the two species above confounded may be easily dis-

* Penn. Brit. Zool. v. 3, p. 132.

PLATE LXVI.

criminated from each other, without regarding other particulars in which they also differ materially. At the present time we have before us the *Tetrodon lævigatus* of Linnæus which Pennant mistakes, the *Lagocephalus* of Linnæus and Bloch, and the Pennantian Globe Diodon, all which are so obviously distinct from each other, that we cannot hesitate in pronouncing them to be three distinct species. A few observations on each of these will not be deemed inapplicable to the subject under consideration.

Lævigatus approaches nearer to our fish than the species *Lagocephalus*: its colours are the same, blue above, and silvery beneath, but in this the abdominal spines are rather recurvate, and arise from an oblique trifurcated root: they are small, numerous, and situated, as Linnæus observes, towards the anterior part of the abdomen. Our fish resembles this, but has the whole surface of the abdomen, down to the vent, armed with spines, instead of the anterior part only: those spines are fewer in number than in the former fish, of a much more conspicuous size, and arise from a distinct stellated root of four processes instead of three; nor is the spine oblique as in the preceding fish, but perfectly erect*. *Lagocephalus* is so remote from the preceding, that a slight description, it is conceived, will be sufficient to distinguish it. Instead of blue, the back is of a yellowish, or testaceous brown, the sides brown instead of silvery,

* That this may not be conceived to arise from accident, or be observable only in a single specimen, it will be proper to observe, that the appearance of the spines, and their quadrifurcated roots, is precisely the same in two specimens of this fish in our own collection, that differ materially in point of size; and we have also seen three others exactly corresponding in this particular.

PLATE LXVI.

and the back and sides marked with conspicuous stripes and spots of black ; the abdominal spines are small, inclining, and diverging at the base into three rays.

From the above remarks it will be obvious that a considerable degree of confusion has heretofore prevailed respecting the before-mentioned fishes. The Globe fish of our seas has not been explicitly described by any author, with the exception of Pennant ; and it may be even doubted whether any other author has hitherto observed it. To obviate further error, we therefore wish to name it *Tetrodon Stellatus*, the Stellated Globe-fish, Mr. Pennant not having given it any Latin specific name ; and that of *Globe Diodon*, the English one adopted by him being inadmissible, for it is a *Tetrodon*, and not a *Diodon* of Linnæus.

The dorsal fin in the specimen figured in the annexed plate contains eleven rays : pectoral fourteen ; anal ten ; and caudal six,

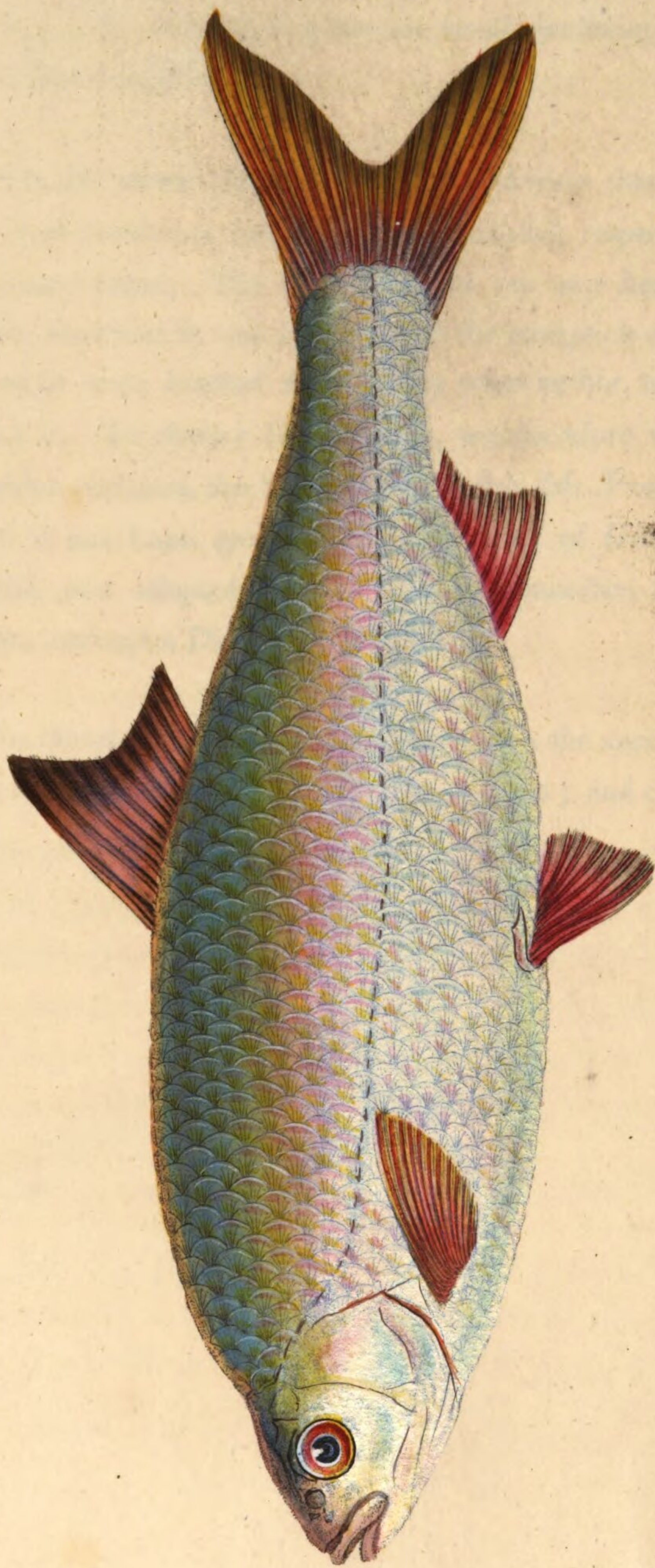


PLATE LXVII.

CYPRINUS RITULUS.

ROACH.

*** PISCES ABDOMINALES.

GENERIC CHARACTER.

Mouth without teeth : gill membrane with three rays : body smooth, and whitish in general : ventral fins usually with nine rays.

SPECIFIC CHARACTER

AND

SYNONYMS.

Anal fin with twelve rays, reddish.

CYPRINUS RITULUS: pinna ani radiis 12, rubicunda. *Linn. Fn.*

Sv. 372.—*Gmel. Syst. Nat. T. 1. p. 1426.*

sp. 16.

Cyprinus iride pinnis ventris ac ani plerumque rubentibus. Art.

Gen. 3. syn. 10. sp. 10.

CYPRINUS RITULUS. *Bloch Fisch. Deutschl. 1. p. 32. n. 2. t. 2.*

Rutilus. f. Rubellus fluviatilis. Will. icht. p. 262.—Jonst. pisc. p. 130.

ROACH. *Penn. Brit. Zool. v. 3. p. 311. n. 7.*

PLATE LXVII.

The Roach is abundant in almost every river throughout the temperate parts of Europe. It is a fish that is known to delight in clear and deep waters in the most retired situations, and in particular prefers those still waters that have a sandy, or gravelly bottom.

In the river Thames the finest Roach are caught about the middle of May, or early in June, when those fish come up in shoals from the sea to deposit their spawn in the higher parts of the river. At that season we have obtained them from the Thames fishermen of a large size and in excellent perfection for the table. Bloch, treating on the Roach found in Prussia, observes, that it seldom attains in that country to a large size, its greatest weight not exceeding a pound, or a pound and a half. We have Roach in England much larger than this. Sir John Hawkins, in his annotations on old Walton the angler, remarks, that on the 15th of September 1754, he caught a Roach at Hampton that measured fourteen inches and an eighth from the eye to the fork, and in weight wanted but an ounce of two pounds; and this even, though of a vast size, proves inconsiderable compared with the largest recorded by Mr. Pennant, the weight of which was five pounds*.

This fish subsists on herbs, worms, &c. The eggs are greenish, and become red by boiling. The dorsal fin in the specimen we have figured contains ten rays: pectoral thirteen: ventral nine: anal twelve; and caudal twenty-two.

* "In a list of fish sold in the London markets, with the greatest weight of each, communicated to us by an intelligent fishmonger, is mentioned one whose weight was five pounds." *Penn. Brit. Zool. T. 3. p. 366.*

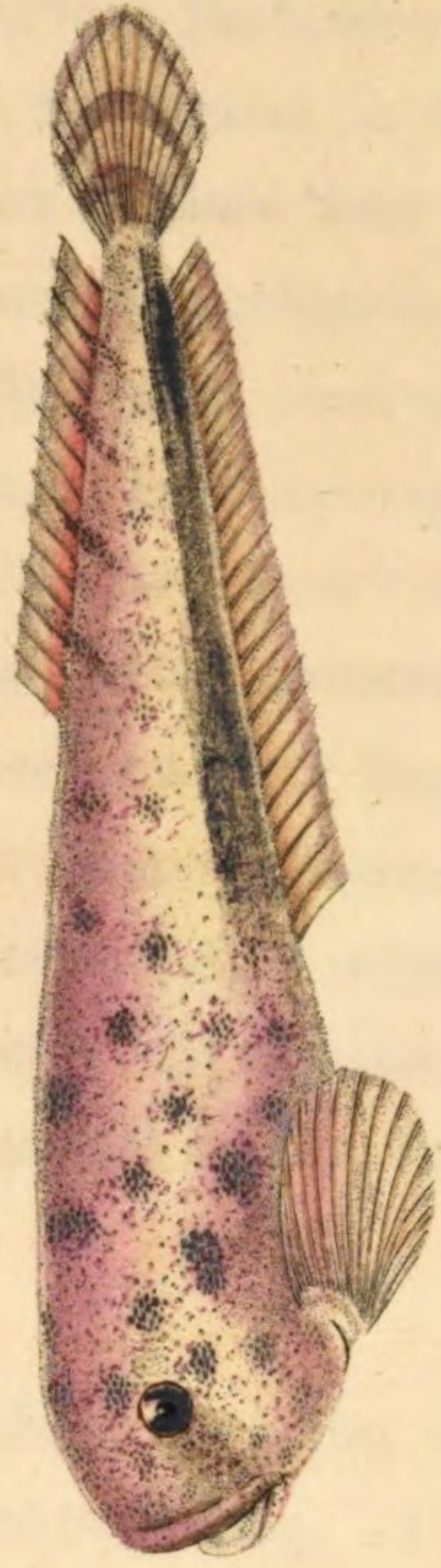


PLATE LXVIII.

CYCLOPTERUS MONTAGUI.

DIMINUTIVE LUMP-SUCKER.

**** *PISCES BRANCHIOSTEGI.*

GENERIC CHARACTER.

Head obtuse, mouth in the anterior part: tongue short and thick, jaws furnished with numerous minute sharp teeth. Branchostegous membrane with four rays: cover of a single piece. Body short, thick, destitute of scales. Ventral fins connected: the sucker between them.

SPECIFIC CHARACTER.

Body naked, lanceolate, diaphanous, tinged with reddish, and spotted with fuscous: dorsal, anal, and caudal fin distinct: organ of adhesion oval.

CYCLOPTERIS MONTAGUI: corpore nudo lanceolato diaphano
rubescente fusco-maculato, pinnis dorsali anali
caudalique distinctis, orbiculo ovali.

For our acquaintance with this beautiful little species of Cyclopterus we are entirely indebted to the friendly communication of George Montagu, Esq. of Knowle House, Devonshire, by whom

PLATE LXVIII.

it was discovered, and in compliment to whom we name it Montagui.

Mr. Montagu has seen three or four specimens of this fish on the Devonshire coast, two of which he found lately near the Thurlstone rock, on the South coast of Devonshire. This diminutive species is about three-fourths of an inch in length: perfectly smooth; of a pale colour, tinged with pink, and marked all over the upper parts and sides with numerous distinct roundish spots of purplish brown. The head is large, and rather inflated about the gills, contracting a little in front: the body decreases gradually as far as the vent, and afterwards still more considerably quite to the tail. The mouth is not large in proportion to the size of the fish: its irides are silvery, with the pupil black: gill covers obscure. It has no visible lateral line. The pectoral fins consist of seventeen or eighteen rays; these are placed just before the sucker or instrument of adhesion, and turn underneath: the ventral fins nearly unite at their base, partly surround the sucker, and are so approximate to the pectoral fins as to appear connected: the anal fin is formed of about thirty rays, commencing immediately behind the vent: the dorsal fin originates a little nearer towards the head*, but many of the first rays are imperceptible without the assistance of a deep lens; those which are conspicuous amount to about sixteen or eighteen, and both the anal and dorsal

* An oversight in the drawing and account sent to us by Mr. Montagu in the first instance has been kindly corrected since the plate was published. Mr. Montagu had delineated and described the dorsal fin as originating lower towards the tail than the anal fin; but soon after discovering another specimen, he perceived that he had before entirely overlooked the anterior part of the dorsal fin, which consists, as above mentioned, of a number of almost imperceptible rays, connected to the series of conspicuous rays that are expressed in the profile figure of the fish; the upper one in Plate 68.

PLATE LXVIII.

fins terminate close to the tail ; the caudal fin is rounded, consisting of fifteen rays, and is marked with two transverse bands. The sucker, or organ of adhesion, is of an ovate form, the disk of which is radiated from a central longitudinal line, and the radius is divided into many lobes or compartments by means of oblique curved lines ; the surface of this part is flat, but forms a prominent rim to the disk. The whole fish when alive is diaphanous, and the fins are remarkably pellucid.

The above description was obligingly communicated to us by Mr. Montagu, who accompanied this account with an elegant drawing taken from the fish while living, or very recent, and kept in sea-water under the lens of a microscope for that purpose ; and it is from this drawing the figures in the annexed plate are copied, not having ourselves been so fortunate as to meet with this curious fish. This is a liberty in which we can scarcely think it right to indulge, having already professed our intention of confining ourselves, in this Work, to those particular species of British fish that happen to fall under our immediate observation, and the originals of which are in our own possession. The present is a solitary, and it is presumed an excusable deviation from our design, to which we have acceded, in our desire to enrich the British *Fauna* with an interesting fish, that might have otherwise been omitted : we neither distrust the accuracy of the drawing, or the account sent with it, considering the respectable quarter from whence it was received ; but it is notwithstanding proper to acquaint the reader upon what authority such a novelty is introduced.

This minute kind of Cyclopterus is brought forward as a new species with some caution. Its diminutive size forms no positive

P L A T E L X V I I I .

criterion of its being new, since it might be only the fry of some kind sufficiently well known when full grown ; but this, we are persuaded, from its characteristic particulars, cannot be the case. It may be the young of a larger species, but whatever may be the size to which it attains at maturity, it is certainly new, in our opinion. The nearest to which it approaches is *Cyclopterus Liparis*, and it is evidently distinct from that. According to Mr. Montagu, the dorsal and anal fin terminate close to the tail, but are not connected with it, as we have observed to prevail unerringly in *Cyclopterus Liparis*. This may not be altogether satisfactory, when we consider how liable the membranes, which connect those fins, are to be severed asunder by accident. The structure of its sucker, or organ of adhesion, offers a more decisive character : that of *Liparis* is circular, with the disk broad, and somewhat heart-shaped : *Cyclopterus Montagui* has on the contrary a sucker nearly of an ovate form, the disk of which is oval. In both, the sucker is divided into two lateral lobes by means of a longitudinal ligament, but in *Liparis* this ligament is broad, of a flimsy texture, and not immediately perceptible among the transverse folds of the sucker, while in *Cyclopterus Montagui* the longitudinal line is narrow, and distinctly marked ; but the exterior outline of the radius, and the disk, are alone perfectly sufficient to prove them distinct species without a reference to any other character.

Several new species of *Cyclopterus* of a small size are mentioned by Gmelin, on the authority of Pallas, who describes them at length, and gives figures of them in his *Spicilegia Zoologica*, neither of which agree however with our *Cyclopterus Montagui*. We at first suspected it might be his *minutus* from its size, general habit, and form of the sucker, but the dorsal spine on the anterior part of the back, and two bony tubercles on the sides, which

PLATE LXVIII.

Pallas describes, removes it entirely from our fish. We are indeed fully satisfied, that it does not correspond with any species of the Cyclopterus genus hitherto described, resting our decision upon the fidelity of the drawing with which we have been favoured, excepting only the omission of the anterior part of the dorsal fin, as before noticed.

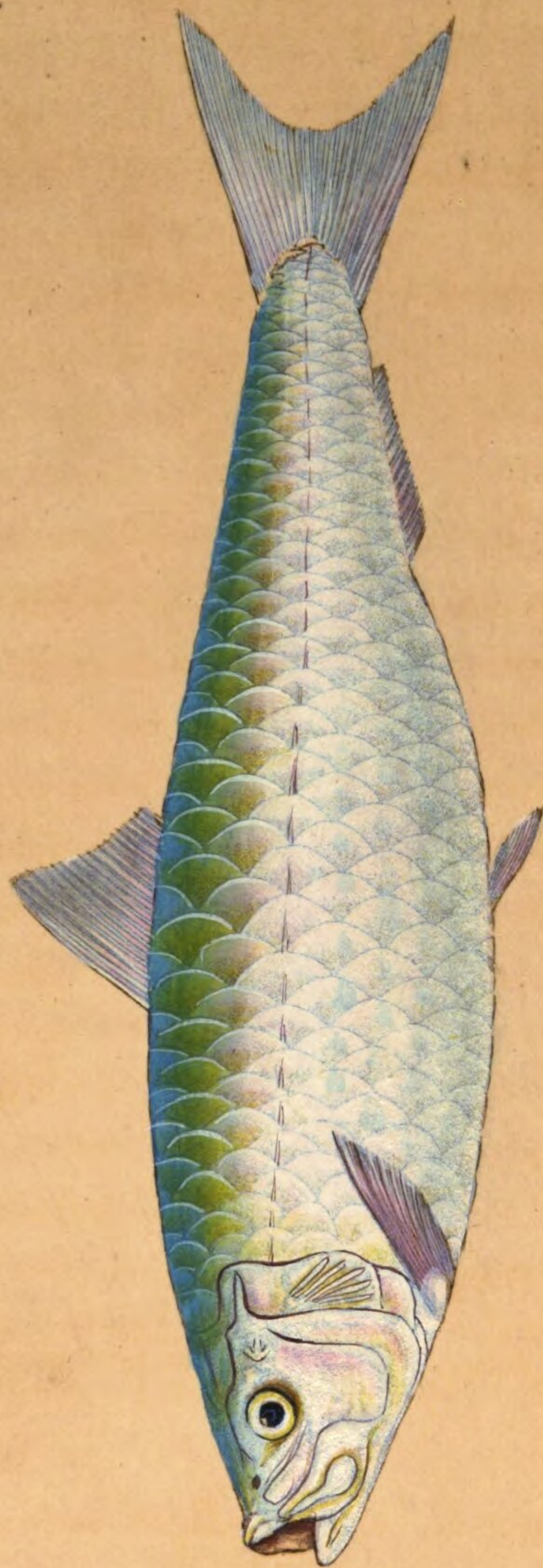


PLATE LXIX.

CLUPEA PILCHARDUS.

PILCHARD.

*** PISCES ABDOMINALES.

GENERIC CHARACTER.

Head compressed; mouth compressed, denticulate within: jaws unequal, upper one with serrated mystaces: tongue short and rough, with inverted teeth: eyes moderate, round, and margined. Gills setaceous: cover, either of three or four plates, membrane with eight rays. Body compressed, elongated, covered with scales of moderate size: lateral line straight, near the back, and running parallel with it: belly carinated and serrated: usually seven rays in the ventral fin: tail bifurcated.

SPECIFIC CHARACTER

AND

SYNONYMS.

Silvery, scales large and adhering firmly, upper jaw ascending: dorsal fin placed centrally.

CLUPEA PILCHARDUS: argentea, squamis magnis arcte infixis, maxilla superiore adscendente, pinna dorsali in medio posita.

PLATE LXIX.

CLUPEA PILCHARDUS: *Bloch. t.* 406.

Clupea δ . *Arted. Synon.* 16.?

Pilchard. Will. Ichth. 223. *Ray. syn. pisc.* 104. *Borlase Cornwall.*

272. *Penn. Brit. Zool.* 3. p. 343.

That casual observers should be apt to confound the Pilchard with the Herring ought not to excite surprise: they cannot but observe the very close affinity of these two species, and may be readily led to believe, from the inferior size of the Pilchard, that it must be the Herring not yet arrived at its perfect growth, and maturity. It is more remarkable, that experienced naturalists should have so implicitly assented to this notion. Linnæus does not mention the Pilchard, although our countryman Ray, from whom Linnæus derived no inconsiderable share of his ichthyological knowledge, gives it as a species distinct from the Herring. Gmelin also omits it in the last edition of the *Systema Naturæ*. Schonvelde was supposed to have noticed it, but it is not certain that the *Peltzer* of that author is the same as our fish, although Pennant refers to it as such among his synonyma. Bloch thinks it is very likely that Schonvelde's *Peltzer*, a fish taken on the coast of Holland (according to that writer,) may be of a different species, and recommends an enquiry to be made among the Dutch naturalists to determine this point. Should it really prove distinct, it would seem that Bloch is the only continental writer who has particularly noticed, or well considered this fish, though its history and peculiarities have been so copiously detailed by several English writers, and by Borlase in his *History of Cornwall* especially. Even Bloch, it seems, was indebted to an English correspondent (Mr. Hawkins) for the only specimens of the Pilchard he was

PLATE LXIX.

able to obtain, previous to the publication of his work on Fishes. This circumstance is the more singular, since we have heretofore been taught to believe it an abundant fish on all the European shores, an idea that seems to us the less certain from the observations of Bloch, and from the silence of so many ichthyological writers as have appeared at various times upon the continent respecting it. We cannot conceive that the Pilchard is peculiarly British, having ourselves seen it from the Mediterranean, but believe upon the whole that it is more abundant on our coasts, and far better known in this country than in any other part of Europe.

The comparative view which Pennant draws between our fish and the common Herring is judicious, and will serve to shew the characteristic differences between those two fishes in the clearest point of view. The specimens he examined were both of the same length, namely, nine inches and an half each. "The body of the Pilchard (he says) is less compressed than that of the Herring, being thicker, and rounder, the nose short in proportion, and turned up, and the under jaw shortest. The back more elevated: and the belly less sharp. The dorsal fin of the Pilchard is placed exactly in the center of gravity, so that when taken up by it, the body preserves an equilibrium, whereas that of the Herring dips at the head, the dorsal fin being placed only three inches eight-tenths from the tip of the nose; that of the Herring four inches one-tenth. The scales of the Pilchard adhere very closely, whereas those of the Herring very easily drop off. The Pilchard is in general less than the Herring. The Pilchard is fatter, or more full of oil *."

* Brit. Zool. Vol. III. p. 346.

PLATE LXIX.

The critical remarks of Bloch upon those two fishes so nearly agree with those of Pennant, that it would be needless to repeat them. After an accurate comparison between them, he is persuaded (as indeed every one must be who examines them with attention) that they are specifically distinct. He speaks of the central position of the dorsal fin, and the magnitude of the scales, in the Pilchard, and those characters are alone sufficient to prove it distinct as a species from the common Herring, to which it is so closely allied.

Our principal fishery for the Pilchard is off the coast of Cornwall, where they appear about the middle of July in vast shoals, but disappear again before winter. They are caught in great numbers by the inhabitants of some parts of Cornwall for the purpose of extracting oil from them. They are also dried, and sent in barrels as an article of export to other countries.

The pectoral fin in the specimen we have figured contained sixteen rays: ventral eight: anal seventeen: dorsal eighteen, and tail thirty-two.



PLATE LXX.

GADUS BROSME.

BROSME, OR SCOTCH TORSK.

** PISCES JUGULARES.

GENERIC CHARACTER.

Head smooth. Seven slender rays in the branchiostegous membrane. Body oblong. Scales deciduous. All the fins covered with a skin. More than one dorsal and anal fin; rays unarmed. Ventral fin slender, pointed.

SPECIFIC CHARACTER

AND

SYNONYMS.

Lower jaw longest: tail rounded, and with the dorsal and anal fin edged with white: ventral fins fleshy, with five cirri.

GADUS BROSME: maxilla inferiore cirroso, cauda rotundata pinnis ventralibus carnis cirris 5: pinnisque dorsali analique albo-marginatis.

GADUS BROSME, ore cirroso, cauda ovali acuta. *Gmel. Syst. Nat.*

T. I. p. 3. p. 1175. Sp. 21.

PLATE LXX.

BROSME. *Ström. Hist. of Sondmör. v. I. p. 272. t. 1. f. 19.*
Ascan. ic. rer. nat. t. 17. Pontoppidam.
Norv. 2. p. 1788.

TORSK, *Penn. Brit. Zool. v. 21. p. 203. sp. 89.*

The Torsk of the Norwegians, Swedes, and Danes, is a very different fish from that known in Scotland under the same name; a circumstance that has given rise to much misunderstanding among English writers respecting those two fishes. The Torsk, or Dorsk, of the north of Europe, with the exception of Scotland only, is the *Gadus Callarias* of Linnæus, a fish distinguished in a particular manner from the Scotch Torsk, by having three fins upon the back, as we find in our common Codfish and Haddock, while the latter is furnished with only one dorsal fin: they are also materially distinct in other respects, but these are the most decisive and unerring characters that prevail in those two species.

The same name being common to both those fishes in different countries, it was long supposed, and admitted without further investigation, that they must be both of the same species. Pennant, in an early edition of the British Zoology, was led into this error through that circumstance: he had learnt that there existed a fish called the Torsk, in the Orkneys, and northern parts of Scotland, and not having seen it concluded it to be of the same kind as Linnæus describes under that name in his *Fauna Suecica*. At a subsequent period this mistake was corrected, on the information of Mr. Low, who sent Mr. Pennant the description, and drawing from which the plate was engraven, that appears in the last edition of the British Zoology.

PLATE LXX.

Mr. Low was then minister of Birsa in the Orkneys, and in 1774, undertook the voyage of Shetland at the request of Mr. Pennant. This gentleman was enabled, from his own immediate observations, to determine that the Torsk of the Swedes is not the Torsk of the Scotch, which renders his remarks not a little interesting. The Torsk it seems, from his account, or as it is called in the Shetlands, Tusk and *Brismak**, is a northern fish, which as yet has not been discovered lower to the southward than the Orknies, and is even rather scarce there. In the seas about Shetland it swarms, and forms either dried, or salted and packed in barrels, a considerable article of commerce.

Ström, a Norwegian clergyman, in his History of Sondmör, speaks to the same effect: he informs us in the north it is called Brosme; and being found in great plenty in the seas adjacent to Sondmör, it constitutes an article of extensive trade there, either salted and barrelled, or dried. His specific description of Brosme is in latin *Gadus Monopterygius, ore cirroso, cauda ovali acuta*, and a figure of the fish, very well agreeing with this description, is given in the miscellaneous plate that accompanies the first volume.

There are three different varieties of the Danish Torsk in the works of Ascanius, all which agree with the Linnæan description of *Gadus Callarias*. According to Ascanius these are all well known to the Danish fishermen by the name of 'Torsk, and to the Germans by that of Dorsk: they are taken in abundance in the sea between the island of Borholm and the north of Bergen, in the Categat, and the

* Perhaps corrupted from *Brosme*, its Norwegian name.

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Baltic. This writer also figures, and describes the *Brosme** in a manner so far correct at least, as to leave no doubt of its being the same as the Torsk of Scotland: the latter species, he observes, connects the *Gadus* with the *Blennius* genus, and is, from its resemblance to the Blenny, called Brosme by the fishermen; that being the name by which the Blenny is generally distinguished amongst them. We have also the authority of Bloch to shew, that the *Gadus Callarias* is the Torsk of the Baltic, and the Brosme a different fish.

The result of those remarks will be sufficient to prove that the Torsk of Scotland agrees in no respect, except in name, with the Torsk of the other northern parts of Europe, and that the Scotch Torsk is beyond a doubt the Brosme of those countries.

Linnæus was constrained to form a new section in his *Gadus* genus for the reception of his species *Mediterraneus*, the only one he was acquainted with that has but one dorsal fin. Gmelin retaining this section of the *Gadus*, describes our fish after *G. Mediterraneus*, as a second species of the same family, upon the authority of Muller, Ström, Ascanius, and others; and in adopting this species he is certainly correct. But besides those two species in the section "*Pinna dorsali unica*," a third occurs in Dr. Turton's translation of Gmelin's work, which does not appear in the original. We could have wished for the sake of perspicuity, Dr. Turton had confined himself in this particular to the two species mentioned by Gmelin, for by the introduction of this third kind the translator has fallen into the lamentable error of describing our Fish under different

* Ic. rer. pl. 17.

PLATE LXX.

names, as two distinct species; first following Gmelin in the description of *Gadus Brosme*, and then placing the Scotch Torsk immediately after it as a new species, under the name of *Scoticus*, not being aware that the Gmelinian *Gadus Brosme*, and the Scotch Torsk are the same!

Dr. Shaw takes occasion to remark, in his account of the Torsk*, that in the Gmelinian edition of *Systema Naturæ*, this species is described from Müller as having an ovate-acute tail, but that the descriptions and figures of other authors uniformly represent that part as of a rounded shape. The description and figure of this Fish in Ström's *History of Söndmör*, must then have escaped Dr. Shaw's notice, for in that work it is represented as Gmelin mentions, with an ovate-acute tail; and it is also described by Ström as being of that form. It is probable that this circumstance, as well as the authority of Müller, might induce Gmelin to describe the tail as above mentioned. But should this be true, Gmelin is not altogether excusable; for in the works of Afcanius, to which he refers as explicitly as to Müller and Ström, the tail is represented of a rounded form; and surely it would have been more advisable, between two such authorities, for Gmelin to have avoided mentioning the shape of the tail in his specific definition (presuming that the fish was unknown to him) than to have given an unqualified assent to either of those authorities. We even suspect it might be this circumstance that misled Dr. Turton; Gmelin having expressly described the tail in his species *Brosme*, to be ovate-acute, and Pennant describing the Scotch Torsk with the tail rounded. We are satisfied the different statements of writers in this respect may have

* Shaw's Gen. Zool. V. 4. p. I. p. 162.

PLATE LXX.

arisen from the condition of the Fish at the time they describe it ; the tail of this Fish, when alive or very recent, being certainly rounded, but becoming somewhat pointed as it dries *. In our specimen it is so : in Pennant's figure it is the same, and so also in that of Ascanius ; we cannot therefore upon the whole but be inclined to think that the figure in Ström, and Müller's description, were taken from the dried fish rather than from recent subjects.

Although the Brosme, or Scotch Torsk, swarms in the North Seas, it is scarcely ever seen more to the southward of Britain than Caithness, in Scotland, and even there very seldom †. It is sometimes brought from Shetland to London for sale, with other salt-fish. In this state it is without the head, that part being taken off previous to salting ; but it is easily distinguished from other salt-fish even then by its single dorsal fin. Some short time ago a friend, who had an opportunity of visiting Shetland and the Orknies, obliged us with a specimen of this interesting fish, which was brought alive in the

* This singularity may be explained with little difficulty: the tail, like the rest of the fins of this fish, when alive or recent, is invested with a skin of such a fleshy nature, as to conceal in a great measure the number and situation of the rays that lie within ; but in drying, this fleshy skin perishes, or shrinks so materially, as to leave the rays almost bare: the tail thus divested of its fleshy skin, assumes the more pointed form of the skeleton of the tail ; for the central rays are in reality longer than the rest, though they appear so only in a very slight degree in the recent fish.

† The Torsk, we are informed in the Swansea Guide, has been found on the coast of Glamorganshire, in South Wales, most likely on erroneous authority; the writer calls it *Gadus Callarias*, but no doubt means the Torsk of English authors, our (*Gadus Brosme*). *Vide Donovan's Tour through South Wales*, Vol. II. p. 108.

PLATE LXX.

well-boat of a fishing smack to London, with the view of enabling us to make our observations on the fish in its most recent state, and it was from this specimen our drawing was immediately taken.

Our figure will render any very copious description of this fish superfluous, its form and colours being represented with accuracy. The length of this specimen is twenty-five inches. All the fins while the fish was recent were fleshy, and, as Mr. Low observes in his account communicated to Mr. Pennant, the skin so thick, and the rays so soft, that they could not be counted without difficulty; but as the fish dried, they appeared sufficiently visible even in the ventral fins, which were thicker, and more fleshy at first than the others. The dorsal fin contains forty-nine rays: pectoral twenty-one: ventral five: anal thirty-seven; and caudal thirty-five. One peculiarity, which we observed in our recent specimen, was a narrow white fillet, extending the whole way along the edge of the dorsal, anal, and caudal fin. This, we are informed by the Scotch fishermen, is characteristic of the Torsk; and it is indeed observable, even in the salted specimens: Mr. Low speaks of this white margin, and upon the whole we think it right to include it in the specific character of the fish. The singular shape, and fleshy consistency of the ventral fins, is also a strong character, but these last are invariably very badly expressed in all the figures of the fish that have occurred to our observation.

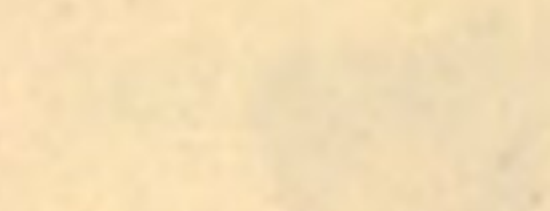
PLATE LXX.

well kept of a fishing smack to London, with the view of exhibiting
to make our observations on the fish in its most favourable light, and it
was from this specimen our drawings were immediately taken.

Our figure will render any very copious description of the fish
superfluous, its form and colour being represented with accuracy.
The length of this specimen is twenty-five inches. All the first whorls
that were recent were black, and as Mr. Low observes in his account
communicated to Mr. Pennant, the skin so thick, and the rays so
soft, that they could not be counted without difficulty; but as the
thin dorsal, they appeared sufficiently visible even in the ventral
ray, which were thicker, and more fleshy at first than the others.
The dorsal fin contains forty-nine rays: pectoral twenty-one;
ventral rays anal thirty-seven; and caudal thirty-five. One piece
which was observed in our recent specimen, was a narrow
white strip, extending the whole way along the edge of the dorsal
fin, and caudal fin. This, we are informed by the French fishermen,
is characteristic of the Torus; and it is indeed observable, even in the
oldest specimens: Mr. Low speaks of this white margin, and upon the
whole we think it right to include it in the specific character of the
fish. The singular shape and fleshy consistency of the ventral fin
is also a strong character, but these last are invariably very badly
expressed in all the figures of the fish that have occurred to our
observation.

Vol. III.

PLATE LXX



and a small

the plant is small and the leaves are small

the plant is small and the leaves are small

the plant is small and the leaves are small

the plant is small and the leaves are small

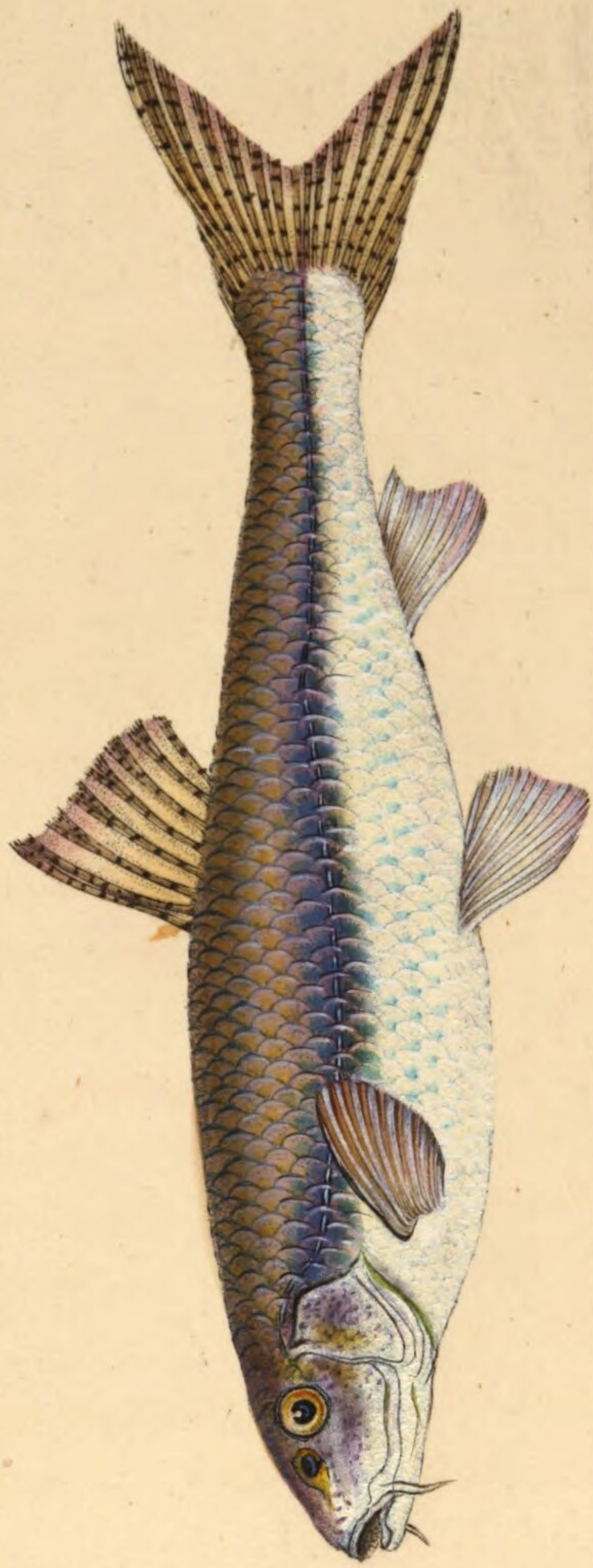
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London. Pub.^d by the Act. directed by B. Donovan, F. C. & J. R. Kingston Jan. 2. 1805.

PLATE LXXI.

CYPRINUS GOBIO.

GUDGEON.

***** PISCES ABDOMINALES.

GENERIC CHARACTER.

Mouth without teeth: gill membrane with three rays: body smooth, and whitish in general: ventral fins usually with nine rays.

SPECIFIC CHARACTER

AND

SYNONYMS.

Anal fin with eleven rays: beards two.

CYPRINUS GOBIO: pinna ani radius 2. cirris 2. *Linn. Mus. Ad. Fr. 2. p. 107.*—*Gmel. Syst. Nat. T. 1. p. 3. p. 1412. sp. 3.*

Cyprinus maculosus, cauda bifurcata, cirro utrinque unico ad angulos oris. *Gron. Mus. 2. p. 2. n. 149. Zooph. 1. p. 104.*

Cyprinus oblongus variis cirris 2 ad angulum oris. *Bloch. Fisch. Deutschl. 1. p. 57. n. 11. t. 8. f. 2.*

PLATE LXXI.

GOBIUS FLUVIATILIS, *Will. Ichth. p. 264. t. 2. 8. f. 4.—Gesn. aq. p. 399.*

GUDGEON *Raj. Pisc. p. 123.—Brit. Zool. p. 308. n. 4.*

The Gudgeon is found in most streams, rivers, and pools of fresh water in England, and in similar situations in all the northern countries of Europe. During the heat of the summer, they haunt the shallows of lakes, and gentle streams; but in the autumn, and during winter, they lie together in shoals in the deepest parts of the water. As spring approaches they again desert the lakes and streams to pass up the great rivers that flow into them, where they assemble to deposit their spawn against stones, or in other places of security.

The female of this species is a full month in spawning, depositing her eggs, a few at a time, during the whole of that period, or even longer. The eggs are of a clear blueish colour and extremely small: those eggs are eagerly sought after by the trout, by perch, carp, and tench, and other fresh water fishes. This circumstance has suggested a hint as to the propriety of introducing Gudgeons into gentlemen's fish-ponds, where any of the before-mentioned species are kept, as being the best means of supplying them with an excellent and, nutritious food; and, when we consider the amazing fertility of the Gudgeon, no doubt with an abundance of it.

This fish subsists on plants, worms, and the fry of other fishes. It is a species remarkable for the elegance of its form; and many of its varieties are beautiful. The season of the year, the quality of the

PLATE LXXI.

waters they inhabit, their food, and age, have each a considerable influence upon the colours of this fish, and will easily account for the variations we so frequently observe in different individuals of this species.

The Gudgeon is a fish that seldom increases to a large size. None of the continental writers speak of its being found above eight inches in length. Pennant remarks, that the few which are caught in the *Kennet* and *Cole* are three times the weight of those found elsewhere. The largest he ever heard of, was taken near Uxbridge, and weighed half a pound. The flesh of the Gudgeon is white, of a delicious flavour, and so easy of digestion, as to be strongly recommended to sick persons. The voracity of this fish is known to every angler: it bites greedily, and may be more readily caught than many other fishes. Even by raking the bed of the rivers where they inhabit, the Gudgeons may be enticed to the spot in shoals, for they resort thither in quest of the worms turned up, and by repeating this about every quarter of an hour, the shoals will be successively increased so greatly, that they may be caught in any numbers. The offal of animals, or bullock's brains thrown into the water, will produce the same effect. Marsigli speaks of its fondness for human flesh: he observes, that during the wars between the Austrians and the Turks some years ago, when several battles were fought on the banks of the Danube, and the mangled remains of both men and horses were thrown into the river, the Gudgeons devoured the former with voracity, but would not eat the horse flesh.

In the dorsal fin of the specimen figured in our plate there are eight rays; pectoral fin fourteen: ventral eight: anal eleven; and in the tail twenty-one.



PLATE LXXII.

LABRUS CORNUBIUS.

GOLDFINNY.

** PISCES THORACICI.

GENERIC CHARACTER.

Teeth acute: lips simple: branchiostegous membrane with six rays, and scaly covers: dorsal fin, with a slender skin beyond the end of each ray; pectoral fin acuminate: lateral line straight.

SPECIFIC CHARACTER

AND

SYNONYMS.

Body variegated with green: near the tail a large fuscous spot: anal fin yellow obliquely banded with fuscous.

LABRUS CORNUBIUS: corpore viridi-variegato, macula prope caudam magna fusca, pinna anali flava fusco oblique fasciata.

LABRUS CORNUBIUS: macula prope caudam magna, pinnaeque dorsalis radiis primis nigris, cauda æquali. *Gmel.*

Syst. Nat. T. I. p. 3. p. 1297. Sp. 67.

GOLDFINNY. *Raj. pisc. p. 163. f. 3.*

GOLDFINNY. *Penn. Brit. Zool. p. 251. Sp. 121.*

PLATE LXXII.

Our enquiries after this curious and most interesting British Fish, has ultimately proved successful, for we have lately obtained a specimen of it in fine condition, that was caught off the Lizard point on the coast of Cornwall. The acquisition of this rare article is an object of no small importance, the species itself being not only extremely uncommon, but the very existence of such a species having rested for almost a century, from the time of Ray to the present crisis, upon the sole authority of Mr. Jago, the person by whom it is recorded to have been discovered. He found it on the coast of Cornwall. A drawing of this Fish, made by Mr. Jago, was communicated by him to Mr. Ray, who inserted it, upon the credit of Mr. Jago, in his Synopsis of Fishes, and it does not seem to have been observed by any writer since that period till the present.

Mr. Pennant speaks of this Fish in his British Zoology, confessing however, at the same time, that he never had an opportunity of examining it*, and is therefore obliged to have recourse to the description given of it by Mr. Jago, who thus describes it. “ In the whole form of the body, lips, teeth, and fins, it resembles the Wrasse : it is said never to exceed a palm in length : near the tail is a remarkable black spot : the first rays of the dorsal fin are tinged with black.”— “ The *Melanurus* of *Rondeletius* takes its name from the black spot near the tail ; but in many instances it differs widely from

* This expression is explicit, and in the words of Mr. Pennant ; but in another part of the same description he tells us, he suspects this species was sent to him from Cornwall. See Vol. 3. p. 252. Brit. Zool.

PLATE LXXII.

this species ; the tail of the first is forked, that of the Goldfinny is even at the end."

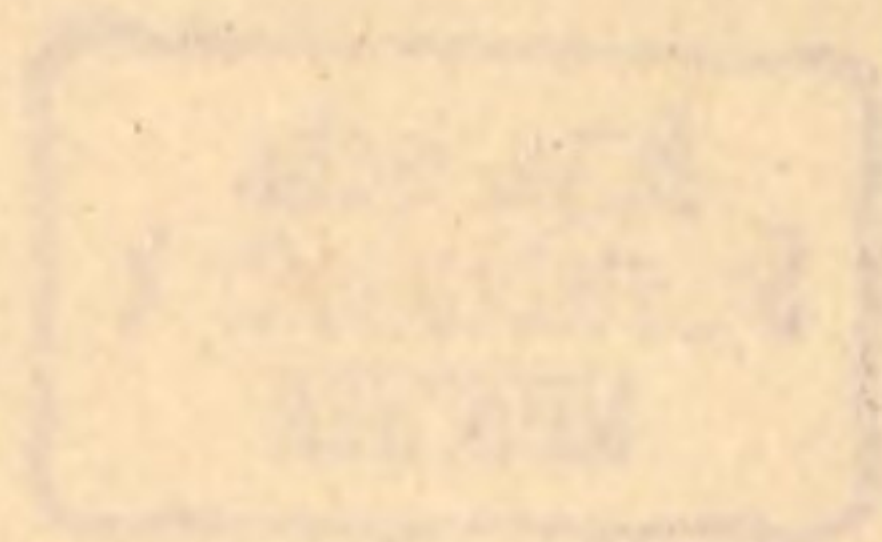
From the above account, and from a reference to their figures, it will be apparent that the Fish we have met with is the same as the Goldfinny, of Jago and Ray, and consequently of Pennant. This point ascertained, we may conceive an accurate drawing of the Fish, likely to prove acceptable to the Ichthyologist, since it will be found to exhibit various characteristic features of this beautiful creature that are not been mentioned by Mr. Jago. None of the continental naturalists seem to be acquainted with it, so far as we have been able to ascertain. Gmelin it is evident relies upon Ray and Pennant, but had Gmelin seen the Fish, or a figure of it, that could be depended on for its fidelity, it is scarcely probable he would have adopted the vague specific character that appears for this species in the last edition of the *Systema Naturæ*. It will be right to observe, that from the name of Goldfinny which it bears, some writers have been led to suppose that all the fins are yellow, which is not the case : it is only the anal fin which appears conspicuously of that colour ; the pectoral and ventral fins are of a much paler hue, and the rest are green, variegated with darker lines of the same, and spots of ferruginous and rufous brown. The jaws are richly tinged with golden yellow, and the sides are yellowish, and silvery.

Our figure represents this Fish in its natural size. In the dorsal fin there are twenty-five rays, the first sixteen of which are soft : pectoral twelve rays, ventral one spiny ray and six soft ones : anal, three spiny rays and ten soft ; and in the tail fourteen rays.



PLATE XXXII

the present the tail of the fish is forked, that of the Goldfish is
even at the end. "and one of the most important points of difference
is the shape of the pectoral fins, which are not as in the Goldfish
from the above account, and from a reference to their figures, it
will be apparent that the fish we have met with is the same as the
Goldfish, of Jago and Ray, and consequently of Pennant. This
point, however, we may consider an accurate drawing of the fish,
likely to prove acceptable to the Ichthyologist, since it will be found
to exhibit various characteristic features of this beautiful creature that
are not been mentioned by Mr. Jago. Names of the continental
naturalists seem to be acquainted with it, so far as we have been able
to ascertain. Gmelin it is evident refers to Ray and Pennant, but
had (under the fish) or a figure of it, could be depended on
for its identity, it is scarcely possible he would have adopted the
vague specific character that appears for this species in the last edition
of the Systema Naturae. It will be right to observe that from the
name of Goldfish which it bears, some writers have been led to
suppose that all the fish are yellow, which is not the case; it is only
the anal fin which appears consistently of that colour, the pectoral
and ventral fins and of a much paler, and the rest are green
variegated with darker lines of the same, and spots of ferruginous
and suberigenous. The jaws are thickly lined with golden yellow,
and the sides are yellowish, and variegated with dark spots.
Our figure represents this fish in its natural state. In the dorsal fin
there are twenty-five rays, the first sixteen of which are soft;
pectoral twelve rays, ventral one spine ray and six soft ones; anal,
thirteen spine rays and ten soft; and in the tail thirteen rays.



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ACCORDING TO

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The natural history of British fishes including scientific and general descriptions of the most interesting species and an extensive selection of accurately finished coloured plates, taken entirely from original drawings, purposely made from the specimens in a recent state, and for the most
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